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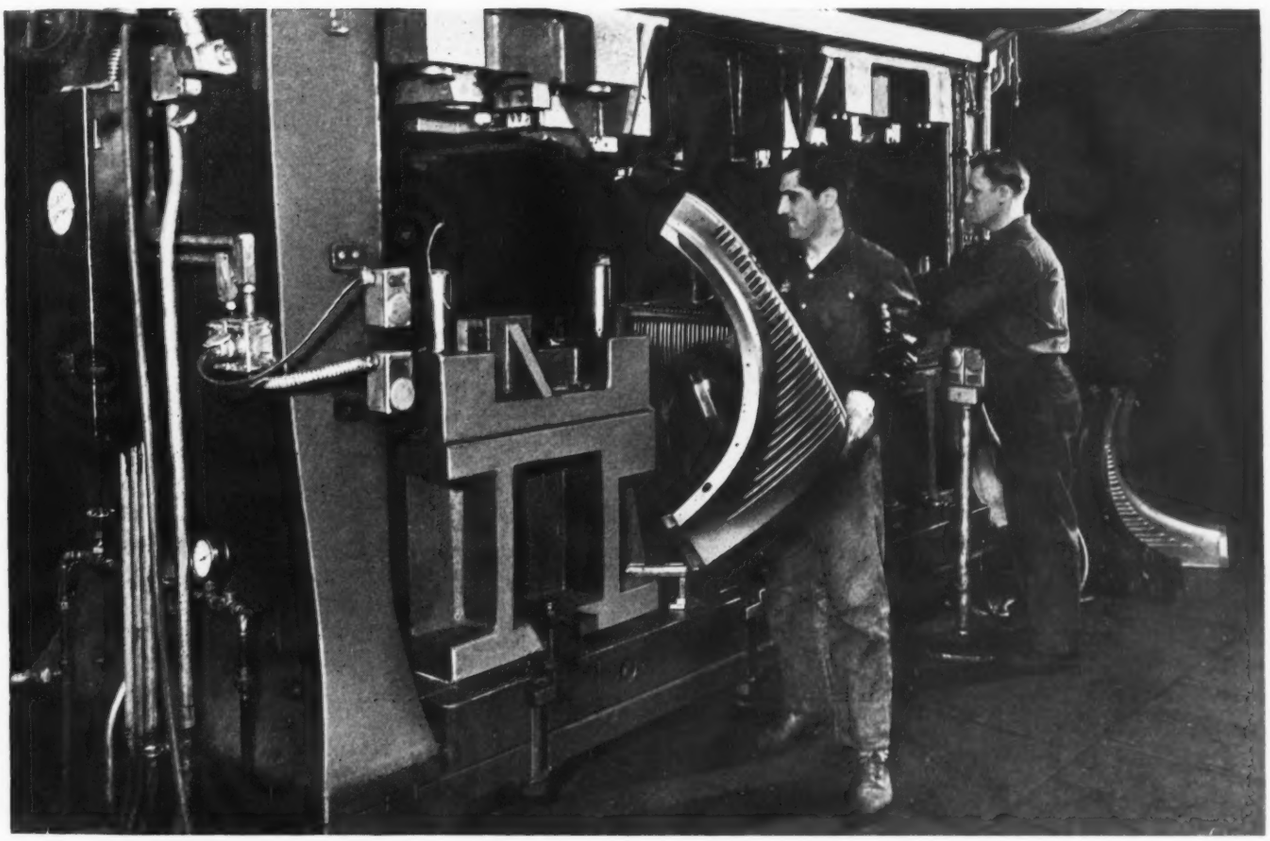


Maximum Economy in Stamping Automobile Radiator Shells

By GEORGE RUMFORD, Operating Manager
De Soto Division of Chrysler Corporation, Detroit, Mich.

Intelligent Planning of All Manufacturing Methods is Essential to the Efficient Operation of Any Press Plant. This Article Shows Typical Methods in One of the World's Most Modern Shops of This Type

ECONOMICAL operation of a stamping plant is dependent primarily upon reducing the handling of the incoming steel, work in process, and scrap to the greatest possible extent; combining the operations to be performed in the smallest number of dies; and holding the scrap to a minimum. The lay-out and up-to-date equipment of the De Soto Stamping Plant facilitate the attainment of these objectives, as will be apparent from the following description of the methods employed in the production of Plymouth radiator shells.

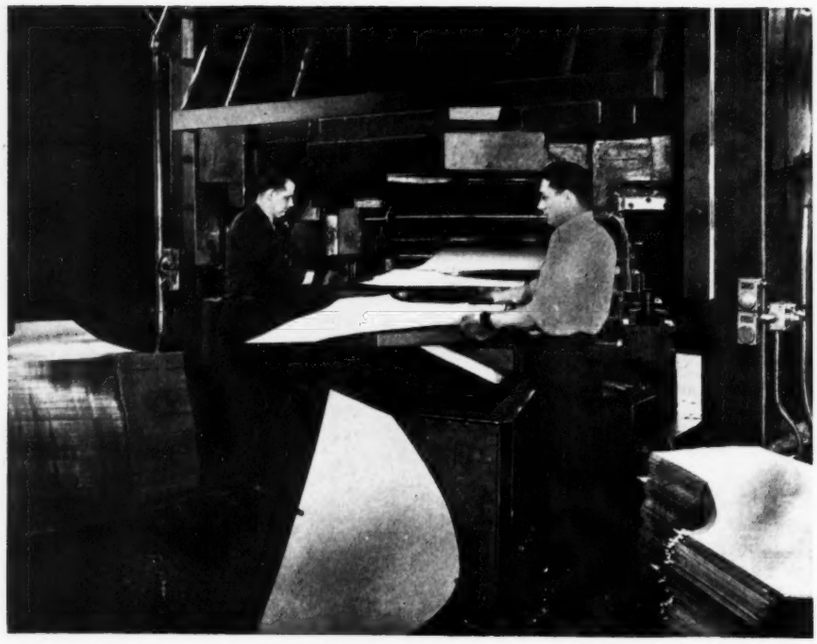


Fig. 1. Blanks for Two Upper and Two Lower Radiator Shells are Cut at One Time with Absolutely No Loss of Material, Due to Nesting of Blanks

Foresight in planning this shop insured that the movement of the incoming steel from gondola cars to the blanking presses is never more than 50 feet, and often it is as little as 9 feet. When the sheets are transferred from the cars to the storage platform, they are automatically weighed by a 10-ton crane scale as described in an article in March MACHINERY dealing with the production of De Soto fenders. This method of weighing has eliminated the necessity of carrying the steel to a scale and then transferring it to a storage space, as is the practice in most stamping plants.

The occasion is indeed rare when scrap can be entirely eliminated in blanking operations, but this is actually accomplished in cutting the blanks for the upper and lower radiator shells of the 1939 Plymouth models. The blanking operation is performed in the press seen in Fig. 1, which has a capacity of 250 tons and is operated at the rate of about 500 strokes an hour. Coiled stock is fed to this press from a cradle reel, which automatically uncoils a loop of stock to the required length for a press stroke and then feeds it quickly into the press through straightening and pinch or pulling rolls. This cradle reel was also illustrated and described in the March article.

Blanks for two lower radiator shells, such as seen at the left in Fig 2, and for two upper shells, as seen at the right, are cut at each stroke of the blanking press. Complete elimination of scrap was

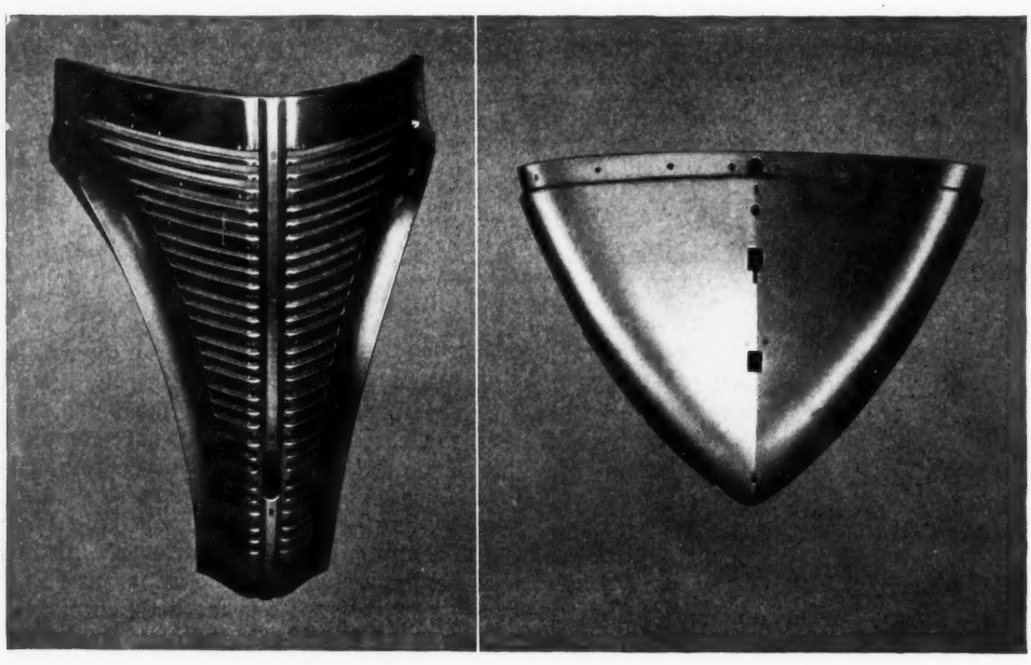


Fig. 2. Lower and Upper Plymouth Radiator Shells (Left and Right) as They Appear at End of Press Operations

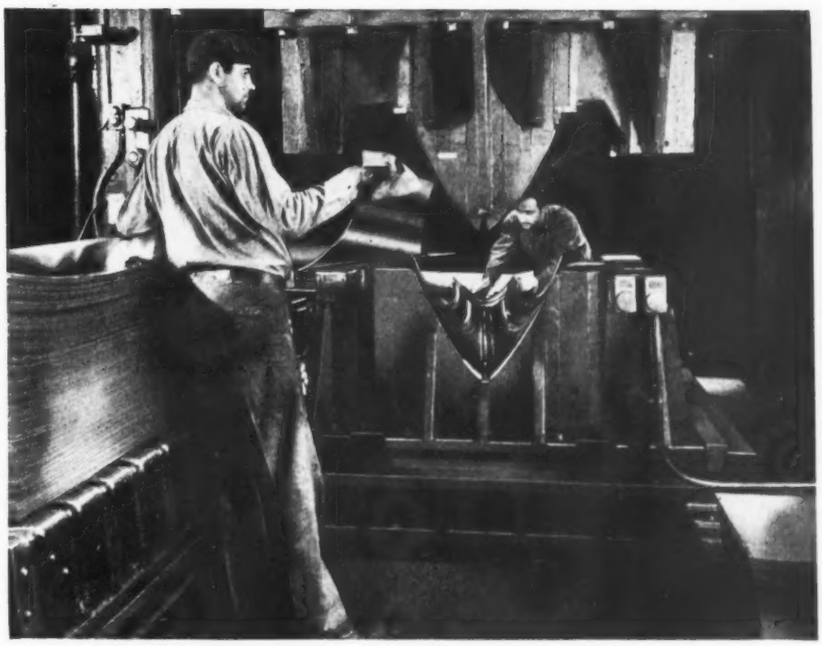


Fig. 3. The Drawing Operation on the Lower Shell Not Only Curves the Shell to Its General Contour but also Starts the Formation of the Louvres

possible by careful "nesting" of the blanks. The smaller blanks for the upper shells drop through the die and slide down chutes to box type trucks at the front and back of the press, as seen in Fig. 1. Narrow slides that hold up the front edge of the steel sheet as it passes over the die openings when fed into the press are automatically withdrawn by cam fingers on the punch unit when the ram descends, so as to provide full openings for the upper shell blanks to fall through the die.

The large blanks for the lower radiator shells are stacked on skids by two operators at the rear of the press. The steel is fed into this machine at an angle so as to conserve floor space. The stock used for these radiator shells is 0.032 inch thick.

Drawing of the lower shell is performed by a 700-ton double-action toggle press provided with the die equipment shown in Fig. 3. When the machine is tripped, the outside portion, or blank-holder, comes down and grips the sheet across the front, back, and sides. As the blank-holder descends, grooves are formed in the sheet, which prevent it from slipping during the drawing operation. At the end of the downward movement of the blank-holder, the upper section of the punch continues moving downward, drawing the blank to the shape seen at the right in Fig. 3. The draw is about 20 inches deep, but it is a comparatively simple one in present-day automotive shop practice. The operator curves each sheet as he places it in

Fig. 4. The Opposite Sides of the Lower Shells are Successively Pierced and Trimmed in a Press Equipped with Two Die Units, as Shown in This Illustration

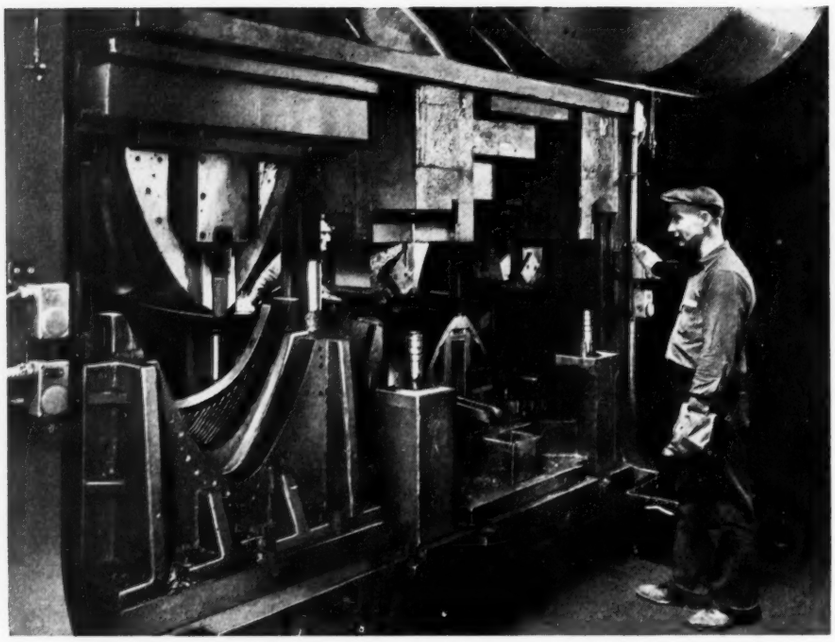


Fig. 5. Dies for Piercing Holes along the Center of the Shell and for Flanging to Insure Accuracy of Final Dimensions and Shape

the die, where it is located by means of gage-pins for the operation.

The shell is next passed to the press illustrated in Fig. 4, which is equipped with two dies for piercing all the holes in the sides of the shell and for trimming the edges. The die at the left performs these operations on one side of the shell, and the die at the right on the opposite side. A minimum amount of stock is trimmed off in this operation, as only sufficient material is allowed to permit the blank-holder to hold the shell during the drawing operation. No more trimming is necessary after these operations.

The punch and die at the left in Fig. 5 are used for restriking the lower radiator shell to insure accuracy of its dimensions and shape. The shell is next put in the right-hand die of the press for piercing all holes seen along the center of the lower radiator shell in Fig. 2 (left), as well as a hole in each louvre. In this case, the piercing punches are in the lower die unit and are operated by slides actuated by cams on the upper die member. Some of the slides operate horizontally and others at an angle. On the up stroke of the press ram, these punches and their slides are returned to their normal positions by spring action.

All of the louvres are slotted and formed downward in the next operation, which is performed by the press shown in the heading illustration. The twenty-seven louvres on one side of the shell are

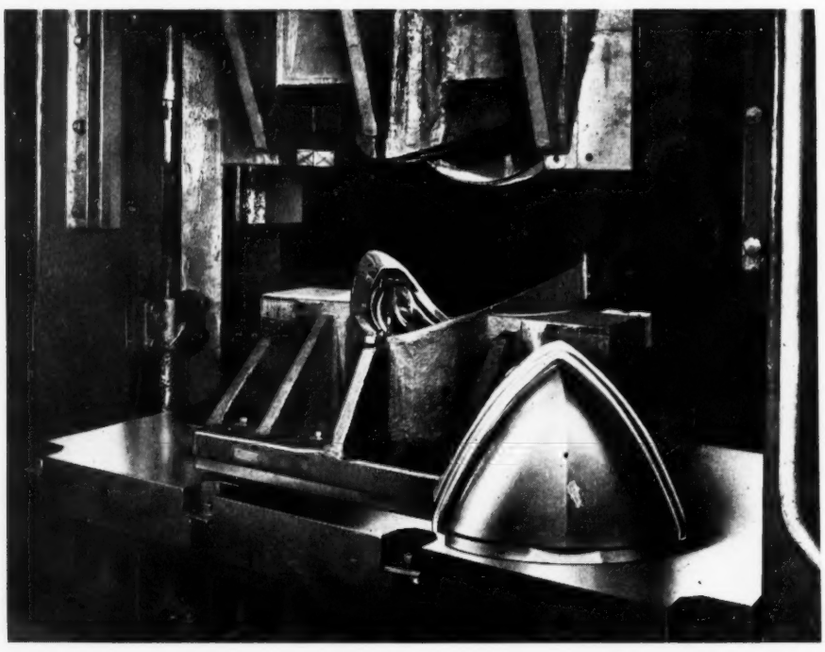


Fig. 6. In Drawing the Shells, Beads are Formed by the Blank-holder and the Lower Die Unit, in Order to Prevent Slippage of the Sheet Steel

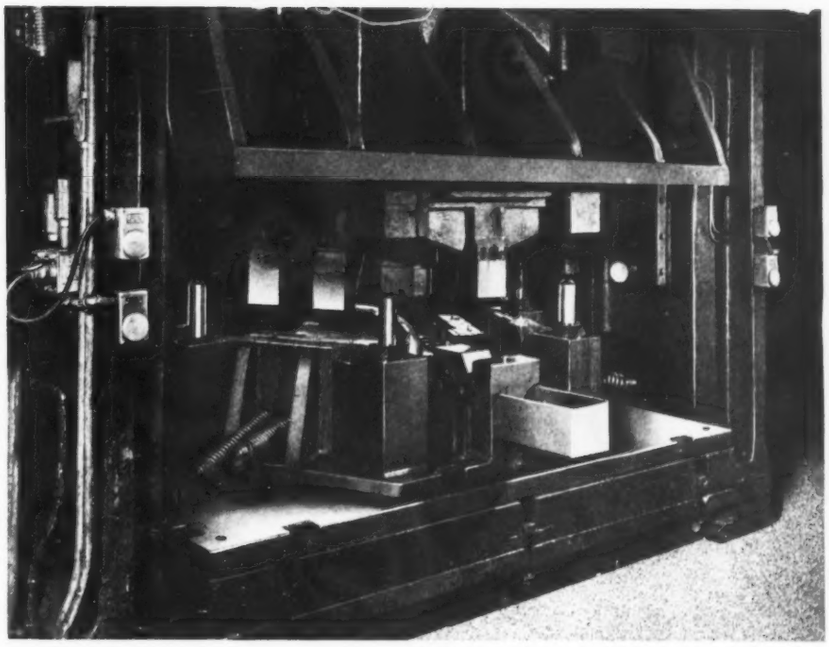


Fig. 7. The Upper Shell is Trimmed and Pierced by a Die which is Built up of a Number of Slides Actuated by Cams on the Upper Die Unit

cut and formed by the left-hand die, and those on the opposite side by the right-hand die. In this operation, small pilot pins on the piercing unit enter the previously pierced holes in the louvre grooves to locate the shell. The louvres are cut and formed downward by punch inserts that can be replaced individually as required. All together, about 130 holes and slots are pierced and cut in the lower shell. The forming of the louvres is the last of the press operations, and the radiator shells are then hung on an overhead conveyor which carries them to another part of the shop for assembly to the upper shells. The distance between any two presses in the line is not more than 7 feet; thus excessive handling of work and operator fatigue are avoided.

Sequence of Press Operations on the Upper Radiator Shell

Although the upper radiator shell is considerably smaller than the lower one, the drawing operation is more difficult, due to the shape of the part. This operation is performed on a double-action press equipped with the punch and die shown in Fig. 6. As in the drawing of the lower shell, the blank is prevented from slipping during the actual drawing due to the formation of beads along the edges of the material by the lower die unit and the blank-holder, which also exerts pressure on the sheet metal while the inside section of the punch is performing the drawing operation.

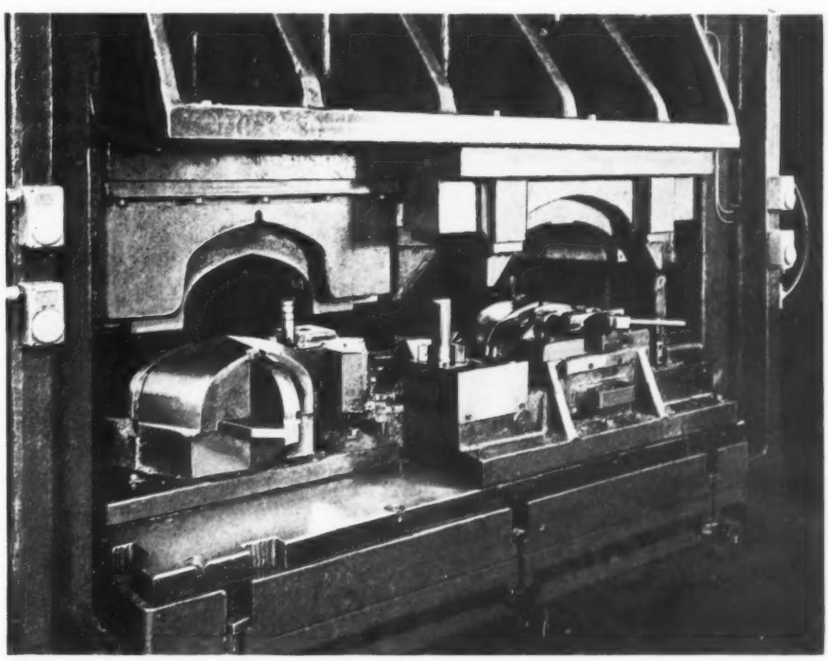


Fig. 8. The Die at the Right Forms Flanges on the Upper Shell, and the One at the Left is Used for Restriking to Insure Dimensional Accuracy

The excess stock across the open end of the shell is next trimmed off by the dies of a 75-ton single-action press which is positioned at right angles to the other presses in the line, after which the shell is transferred to the 250-ton press shown in Fig. 7 for trimming the two sides leading to the nose and for piercing holes horizontally through these sides. The piercing punches and trimming tools are mounted on slides that are operated in horizontal planes by the action of cams on the upper die unit, which force the punching and trimming slides toward the work. The slides are returned to their normal positions by springs when the press ram again ascends. The piercing punch slides are located in various angular positions as required to pierce the holes at right angles to the changing contour.

The upper shell is next passed to the die seen at the right in Fig. 8, which forms flanges under the curving sides of the shells by means of slides operated horizontally by cams on the upper die member. At the end of this operation, the radiator shell is pushed forward along the die, to release it, by means of the lever seen on top of the die. The die at the left in Fig. 8 is used for restriking the shell to insure dimensional accuracy.

The upper radiator shell next reaches the press illustrated in Fig. 9, which is equipped for piercing all the remaining holes. Three piercing punch slides are moved toward the work in angular planes as flat blocks on the press ram come in contact with the top surfaces of the slides. There are also piercing punch slides that move sidewise on the upper die, and punches in that unit which operate straight downward into openings in the lower die. These radiator shells are now hung on the same overhead conveyor as the lower shells for transfer to the section of the shop where the two parts are assembled together by a welding operation.

Clinch Riveting and Welding the Radiator Shells

Both radiator shells are transferred from the overhead conveyor to a platform conveyor that carries them first to the "Rivitor" seen in Fig. 10, which rapidly drives two clinch nuts into the bottom end of the lower shell. The nuts are automatically fed from a revolving hopper to a transfer bar that carries one nut at a time to a die beneath the vertically reciprocating punch. The punch folds over the edges of the nut to secure it to the radiator shell. The transfer arm is air-operated to feed a nut to the punch each time that a foot-treadle is depressed.

The shells are next carried by the conveyor to the machine illustrated in Fig. 11, which is employed for spot-welding the upper and lower shells together. The top shell is slipped over a horizontal fixture with the flanges upward, and is held by the flanges while the operator places the lower shell on top and swings two arms of the fixture together, as shown, to hold the two parts tightly against each other in the correct position. With the operation of a foot-treadle, an electrode head is then lowered and the welding operation automatically started. Twenty-two welds are made in rapid succession, after which the electrode head automatically returns to its starting position. The floor-to-floor time in this multiple welding operation is only seven seconds.

Except for a final piercing operation after assembly and finishing and buffing, the work of the Stamping Division on the radiator shells is now completed and the shells are ready for delivery to the paint department. The accuracy of the work performed in all of the operations that have been described is checked periodically by means of gages that verify both dimensions and shape.

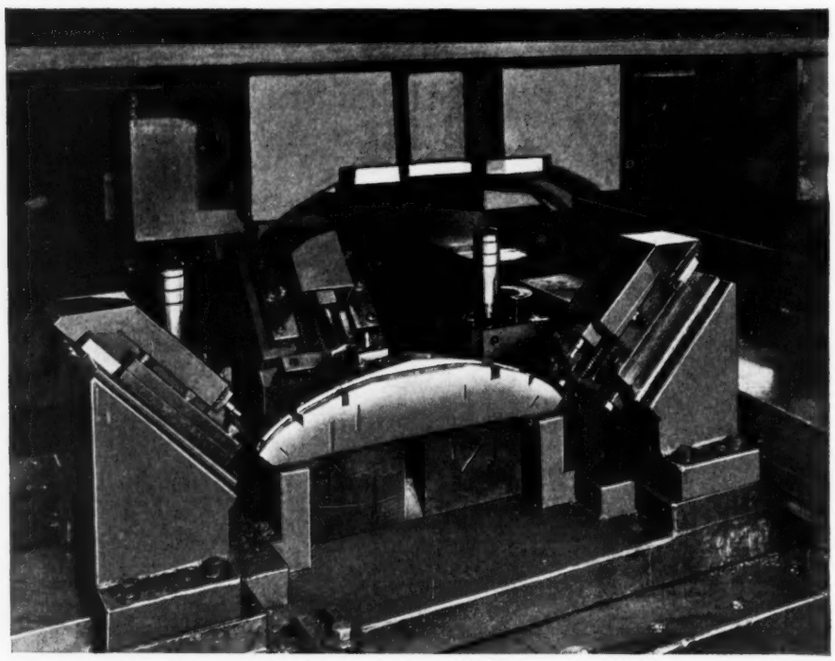


Fig. 9. Another Die Made up with Cam-operated Slides for Performing a Considerable Number of Piercing Operations on the Upper Shell

Fig. 10. Two Clinch Nuts are Fastened to the Bottom of the Lower Shell by a High-speed Machine as Shown in This Illustration

Fig. 11. Twenty-two Spot Welds are Made in Rapid Succession to Fasten the Upper and Lower Shells together along Their Flanges

Machine Tool Show in Cleveland Promises to be Largest Ever Held

THE exposition of the National Machine Tool Builders' Association, to be held in Cleveland, October 4 to 13, promises to be more extensive than any previous show sponsored by the Association. The exhibitors who will show their machines and products in Cleveland now number close to two hundred, occupying 150,000 square feet of floor space; the exhibits will include not only every type of machine tool, most of them in operation, but also many different kinds of accessories, tools, attachments, etc.

In conjunction with the Machine Tool Show, a number of meetings of leading engineering societies will be held in Cleveland. These meetings, known as the Machine Tool Congress and sponsored by the professional engineering societies, will comprise seven evening sessions. Outstanding papers will be presented at these sessions by men well qualified to speak on their respective subjects. The Machine Shop Practice Division of the American Society of Mechanical Engineers will sponsor two papers, one dealing with new developments in foundry practice and cast iron in the machine building industries, and another with welded machine frames, bases, and parts. These papers will be presented at the session to be held Thursday evening, October 5.

More than 50,000 people visited the machine tool exposition in 1935, including officers and directors of manufacturing companies—large and small—throughout the country, operating executives, engineers, and production men. It is planned to limit the attendance to qualified visitors; admission to the Show will be by registration only.

* * *

Every time that a passenger buys a railroad ticket, ten cents out of each dollar paid for it goes to defray the taxes imposed on the railroad.

Saving Costs by Electric Heating of an Embossing Press

By L. A. STROBEL
The Detroit Edison Co., Detroit, Mich.

Embossing Press, in the Operation of which Several Advantages are Gained by the Use of General Electric Co.'s Strip Heaters

THE application of electric heat to the embossing press shown in the accompanying illustration has increased production 15 per cent and decreased costs as much as 40 cents an hour. This, in turn, has resulted in an increase of 16 per cent in the net returns from the investment in the equipment.

The press is used in the manufacture of car linings from asphalt-impregnated pulp paper. An imitation leather grain is embossed in the paper by pressing it between two dies. The paper board is approximately 3/32 inch thick. It passes through the press at a maximum rate of 500 sheets per hour, the production being limited by the speed with which the embossed board can be removed from the dies.

To facilitate the process, heat is applied to the die that is used to emboss the design in the board. This causes the asphalt to come to the surface of the board, which softens it, permitting the dies to form the desired impression. Accurate temperature is necessary. Too high a temperature causes so much asphalt to flow that the board sticks to the dies. Too low a temperature does not soften the board enough to permit a deep clear-cut impression. Hence, the close temperature limits of electric control are very desirable.

Formerly the press was heated by steam supplied by the plant boiler during the winter months, and by a separate gas-fired boiler during the summer. This made it necessary to bring in the fireman one and a half to two hours earlier in the morning, so that the press would be ready to operate when the rest of the force arrived. Maintaining temperature within reasonable limits was difficult, particularly when the boiler loads were fluctuating. This meant considerable waste of time, waiting for the correct temperatures to be obtained. Different materials require different temperatures, which involved an additional waste of time, all of which increased the cost of production.

During the summer, the operation of the small boiler, located close to the press, made working conditions very uncomfortable. This situation led to the consideration of electric heat for the press operation. A satisfactory solution to the problem was achieved by clamping General Electric Co.'s strip heaters to the top of the upper platen. The platen is a brass casting, 36 by 60 inches, and is 4 inches thick. The strip heaters, which have a watt density of 23.8 watts per lineal inch and 6.8 watts per square inch, are installed crosswise of the platen. There are twenty-two 750-watt heaters, which includes eight spare heaters that can be cut in for replacement purposes. Between the heaters are spacers of the same thickness as the heaters, which distributes the pressure equally over the entire area, as the heaters carry their share of the pressure of the press.

The operator can adjust the working temperature at will by setting the thermostat mounted on the side of the press, and the temperature is then held to this predetermined value within satisfactory limits. To give the actual temperature, the thermostat bulb is buried in the center of the upper platen and is connected through an armored flexible cable to the thermostat.

The illustration shows the wiring trough removed, exposing the connections to the ends of the strip heaters, the thermostat bulb, flexible armored lead, and thermostat. The piping visible in the photograph is the former steam supply and exhaust; this piping is now being used for quickly cooling the press with cold water. Water is supplied from the right, circulated through the platen, and exhausted to the left. The strip heaters provide quicker heat recovery than was available with steam and give higher temperatures, which increases production.

MACHINERY'S DATA SHEETS 399 and 400

RECOMMENDED NICKEL CAST-IRON COMPOSITIONS—3

To Meet American Society for Testing Materials' Class 35 Specification
Tensile Strength 35,000 to 40,000 Pounds per Square Inch

	Light		Medium		Heavy			
Section	1/4 to 1/2 Inch		1/2 to 1 Inch		1 to 2 Inches		2 to 4 Inches	
Brinell Hardness	180	220	180	220	180	220	180	220
Machinability	Readily Machined	Good	Readily Machined	Good	Readily Machined	Good	Readily Machined	Good
Wear Resistance	Good	Very Good	Good	Very Good	Good	Very Good	Good	Very Good
Density	§	¶	§	¶	§	¶	§	¶
Total Carbon	3.20-3.40	3.10-3.40	3.20-3.40	3.10-3.30	3.00-3.20	3.00-3.20	3.00-3.20	2.90-3.10
Manganese	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.75-0.95	0.75-0.95	0.75-0.95
Phosphorus*	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Sulphur*	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.12
Silicon	2.00-2.30	2.00-2.30	1.40-1.60	1.40-1.60	1.20-1.40	1.20-1.40	1.00-1.20	0.90-1.10
Nickel†	1.00	1.50	1.00	1.50	1.50	1.50	1.25	2.00
Chromium	None	0.45-0.55	None	0.35-0.45	None	0.25-0.35	0.25-0.35	0.25-0.35

*Maximum. †Minimum. §Sound within section limits at top of column. ¶Sound throughout widely varying sections.

MACHINERY'S Data Sheet No. 399, August, 1939

Based on a Compilation by the International Nickel Co., Inc.

RECOMMENDED NICKEL CAST-IRON COMPOSITIONS—4

To Meet American Society for Testing Materials' Class 40 Specification
Tensile Strength 40,000 to 50,000 Pounds per Square Inch

	Light			Medium			Heavy					
Section	1/4 to 1/2 Inch			1/2 to 1 Inch			1 to 2 Inches			2 to 4 Inches		
Brinell Hardness	180	220	260	180	220	260	180	220	260	180	220	260
Machinability	Readily Machined	Good	Economically Machined	Readily Machined	Good	Economically Machined	Readily Machined	Good	Economically Machined	Readily Machined	Good	Economically Machined
Wear Resistance	Good	Very Good	Excellent	Good	Very Good	Excellent	Good	Very Good	Excellent	Good	Very Good	Excellent
Density	§	¶	¶	§	¶	¶	§	¶	¶	§	¶	¶
Total Carbon	3.20-3.40	3.10-3.30	3.00-3.20	3.10-3.30	2.90-3.10	2.80-3.00	3.00-3.20	2.90-3.10	2.80-3.00	2.90-3.10	2.80-3.00	2.70-2.90
Manganese	0.55-0.75	0.55-0.75	0.55-0.75	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95
Phosphorus*	0.30	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sulphur*	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.12	0.12
Silicon	1.60-1.80	1.40-1.60	1.20-1.40	1.20-1.40	1.10-1.30	1.00-1.20	1.00-1.20	1.00-1.20	0.90-1.10	0.90-1.10	0.80-1.00	0.70-0.90
Nickel	1.25	1.25	2.00	1.25	1.75	1.75	1.25	1.75	1.75	1.25	2.00	2.00
Chromium	None	None	None	None	None	0.25-0.35	None	None	0.25-0.35	0.25-0.35	0.35-0.45	0.50-0.60

*Maximum. §Sound within section limits at top of column. ¶Sound throughout widely varying sections.

MACHINERY'S Data Sheet No. 400, August, 1939

Based on a Compilation by the International Nickel Co., Inc.

Die Design and Construction

A Treatise on the Principles Embodied in the Design of Different Types of Sheet-Metal Blanking, Forming, and Drawing Dies—Twelfth of a Series of Articles

By CHARLES R. CORY*

THE present installment of this series of articles will deal with piercing, cutting-off, and forming dies—that is, piercing and cutting-off dies to which a forming operation has been added. Obviously, the number of operations necessary to produce a part is reduced by this combination. A saving in cost results from the reduced die cost; and time is saved because the forming operation, if handled separately, is usually slow.

If right- and left-hand parts are to be made, the addition of a forming operation to a piercing and cutting-off die makes it necessary to use two dies. In that case, these two dies may cost more than a single cutting-off and piercing die capable of producing either right- or left-hand blanks plus two forming dies or a double forming die. However, if production is high, the saving in cost of operation may be more important than the increased die cost.

*Die Engineer, Fisher Body Division, General Motors Corporation, Detroit, Mich.

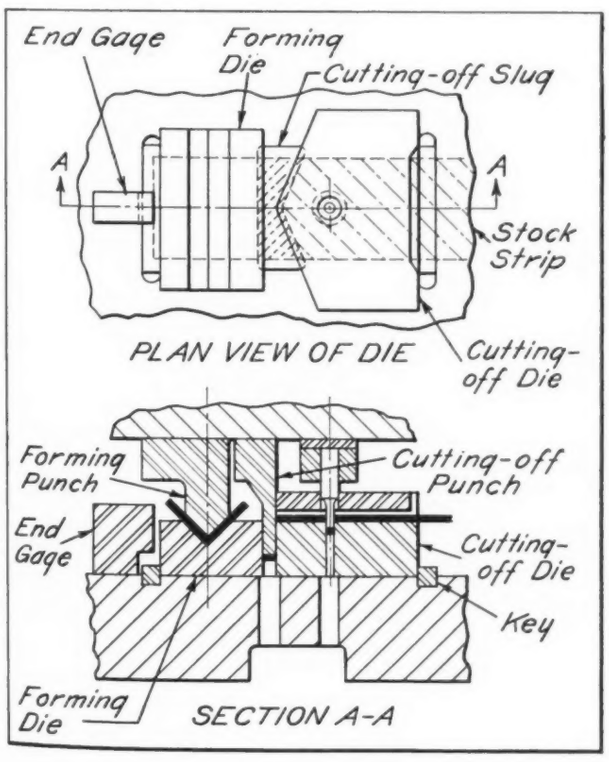


Fig. 1. Piercing, Cutting-off, and Forming Die of the Slug Type

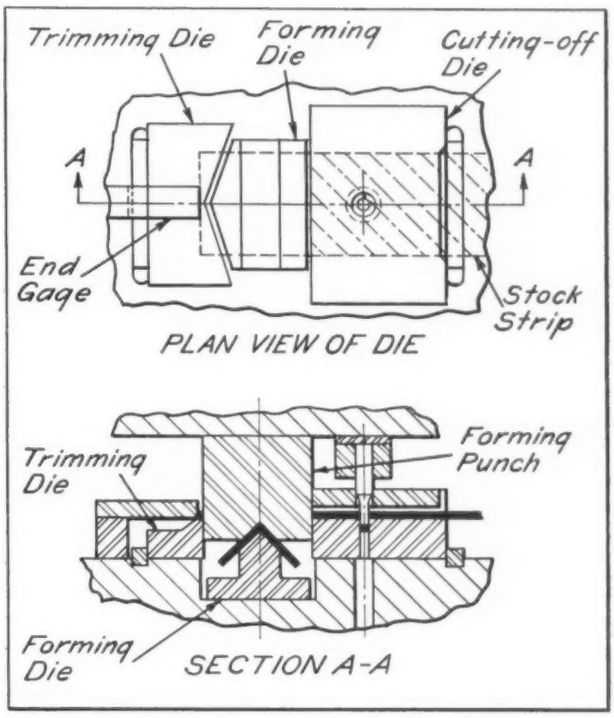


Fig. 2. Shear Type Die with Trimming Die at Forming Station

The forming operation is usually added in the cutting-off stage. The blank is cut off from the stock strip, and at the bottom of the stroke it is formed to the required shape. With this arrangement, the number of stages is not increased, since the cutting off and forming are performed in the same stage or operating position.

The cutting-off operation may be either of the shear or the slug type, depending on the outline of the blank, the same rules applying as for shear or slug type cutting-off dies without the forming operation. Trimming dies can also be used in connection with the cutting-off operation, as explained in previous installments. Fig. 1 shows diagrammatically a typical piercing, cutting-off, and forming die of the slug type used to produce a part with dissimilar ends. Fig. 2 shows a similar die of the shear type, in which a trimming operation at the end of the blank is included in order to produce a part with dissimilar ends. Fig. 3 shows a typical shear type die for a blank with similar ends or for

a blank with ends only partly similar, requiring notching in a preceding stage.

The forming operation may be of four different types: (1) Solid forming; (2) pressure-pad forming; (3) combination solid forming and pressure-pad forming; and (4) draw forming.

Die Design for Solid Forming

The V-shaped part seen in the closed die, Fig. 3, is produced by a solid forming operation. The part is "spanked" to the required shape by the punch which forces it against the forming die, no pressure pad being used to hold any part of the blank from shifting.

In the solid forming type of piercing, cutting-off, and forming die shown in Fig. 3, the punch cuts off the blank from the stock strip and also forms the blank. To provide rigidity, the punch fits against the heel of the die-shoe, which may be either a boss cast on the shoe or a loose heel block. This heel takes the side thrust of the cutting-off operation.

The part to be formed is usually "balanced" or tipped in the die in such a way that the punch will come in contact with the blank at the front and rear ends at the same time. If this is the case, and if the part is formed with equally steep angles at each end, as shown in the illustration, there will not be much tendency for the blank to shift. If the angle of the formed part is steeper at one side than the other, as shown at *A* and *B*, Fig. 4, there is a tendency for the blank to shift. This may be compensated for by an adjustment of the gages to locate the blank in an offset position, so as to make the required allowance for shifting. If the amount of blank shifting varies from blank to blank, this variation cannot be taken care of by gage adjustment.

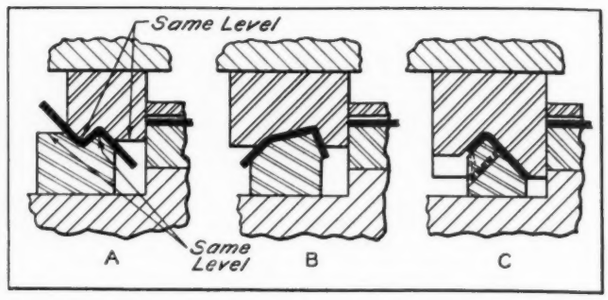


Fig. 4. Diagrams Showing Dies Designed for Angle-forming Operations

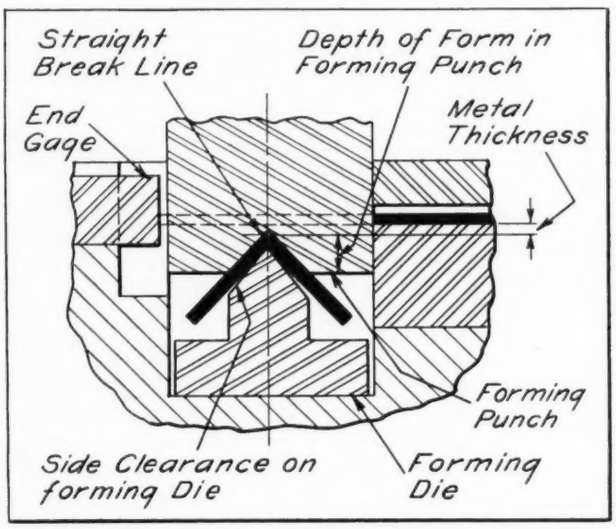


Fig. 5. Die for Cutting-off and Forming Operations

If the part has a straight break line, the punch does not have to spank the entire area of the part. Solid forming for a comparatively short distance from the break is sufficient, as indicated at *A* and *B* in Fig. 4.

If the form break line in either the plan or elevation view is not straight, the entire blank must be spanked with the punch and die, as shown at *C* in Fig. 4. The reason is that the blank area not spanked will be distorted. When producing a straight break, the blank will swing to its formed position as a unit; but when producing a sweep break, the blank will not swing as a unit. There is an advantage in reducing the area of spanking, since a shallow form in the punch will result in less blank shifting, the blank shifting being in proportion to the vertical depth of the form in the die.

Whether a solid forming die can be used for producing a break line that is not straight depends on the sharpness of the sweep in the break line and the thickness of the stock. The less sharp the break sweep and the thicker the stock, the more likely it is that a solid forming die can be used.

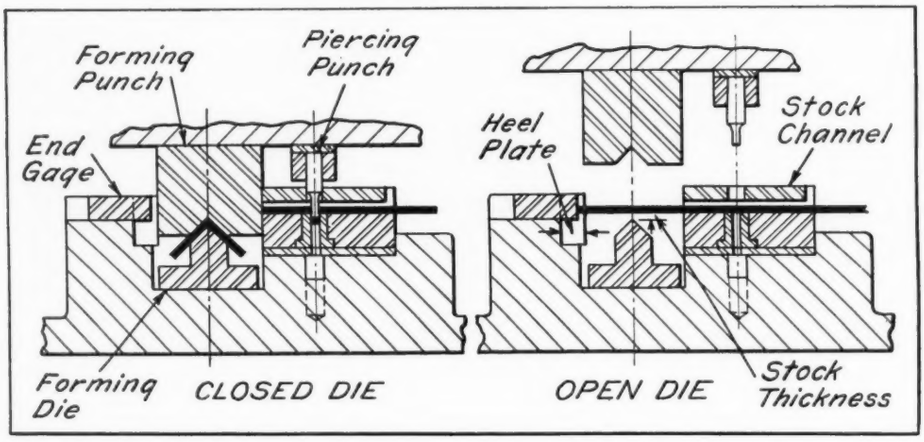


Fig. 3. Shear Type Die for Blank Having Similar or Nearly Similar Ends

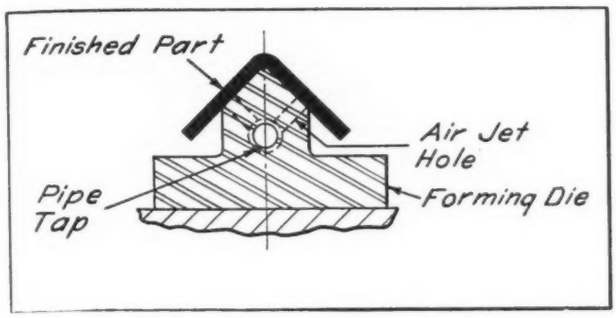


Fig. 6. Die Designed for Ejection of Work by Compressed Air

The topmost part of the forming die or die-block should be below the level of the stock strip in the stock channel. It should be the full metal thickness lower in elevation, so that the blank is cut off from the stock strip before the forming operation starts (Fig. 5). If this were not the case, the stock strip would be pulled through the stock channel by the operation of forming before it is separated from the blank. On the other hand, if the top of the die were too great a distance below the stock strip, the blank would have a chance to shift sidewise if it tipped while dropping to the level of the forming die.

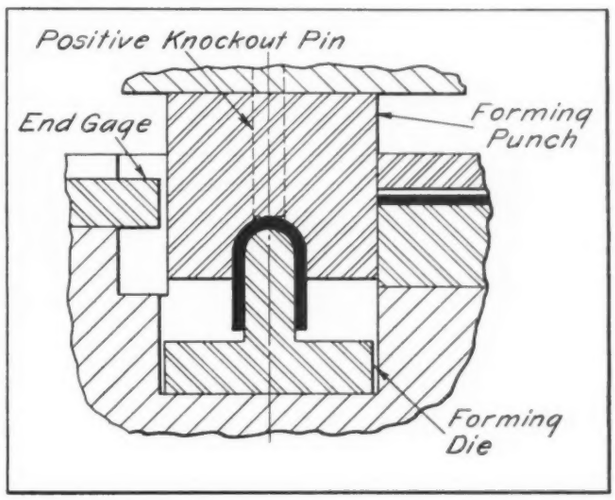


Fig. 7. Forming Die with Punch Equipped with Positive Knock-out

The die forming block should be of hardened steel if the total production is expected to be reasonably high, or even if the production is low, when the stock is thick; otherwise, it may be made from soft steel or from a casting. In producing a large part, the forming die-block may be cast integral with the die-shoe.

Sometimes the forming die is machined to a steeper angle or form than the punch, as shown in Fig. 5. This angle or clearance makes it possible to over-bend the blank to allow for a spring-back.

The die is much more efficient if the finished part is removed automatically. In a piercing, cutting-off, and forming die, the finished part ordinarily lies on top of the die forming block and usually cannot be pushed out by the stock strip because of the end gage. There are four methods of ejecting the part automatically: (1) The finished part may be blown off the die forming block by a jet of compressed air; (2) it may be lifted to the level of the cutting-off die by a spring knock-out, if it tends to stick in the forming die so it can either slide off or be blown off the die; (3) it may be clutched with spring fingers and carried up with the punch on the up stroke until it is released by a positive knock-out; (4) a lift-out knock-out may be used.

There is a limit to the size and weight of parts that can be blown off. The air is usually controlled by a valve which is operated by the press ram. The jet of air is released on the up stroke of the ram and is shut off at the top of the stroke. Some presses are equipped with an air pump which compresses air on the down stroke of the ram and releases a jet on the up stroke.

The air-hose has a nozzle which usually releases a thin wide jet of air. This jet is more effective if the part is lifted a slight distance off the die forming block by a spring plunger. Another method is to grind a clearance in the die forming block under the edge of the part at some convenient spot. If the part is easy to blow off, these devices are not necessary. Still another method is to attach the air-hose to the block so that air passes through holes in the block beneath the part as

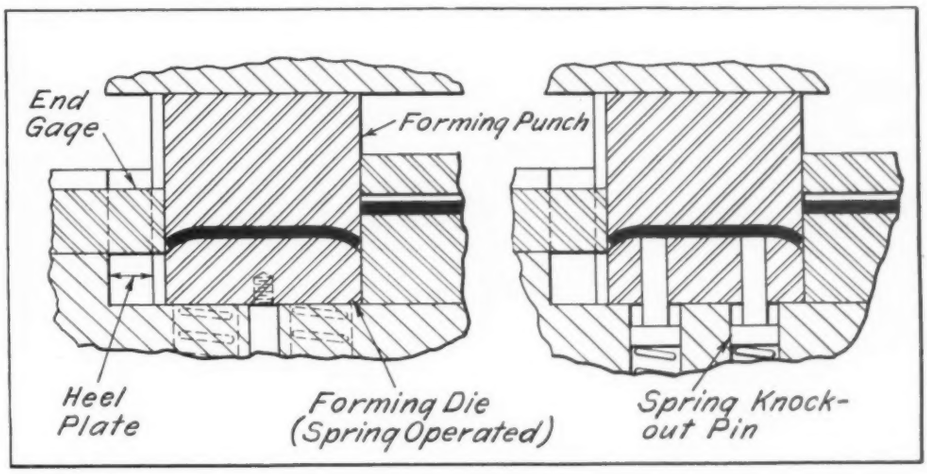


Fig. 8. (Left) Die with Spring Pad for Raising Part to Top of Cutting-off Die. (Right) Die with Spring Knock-out Pins

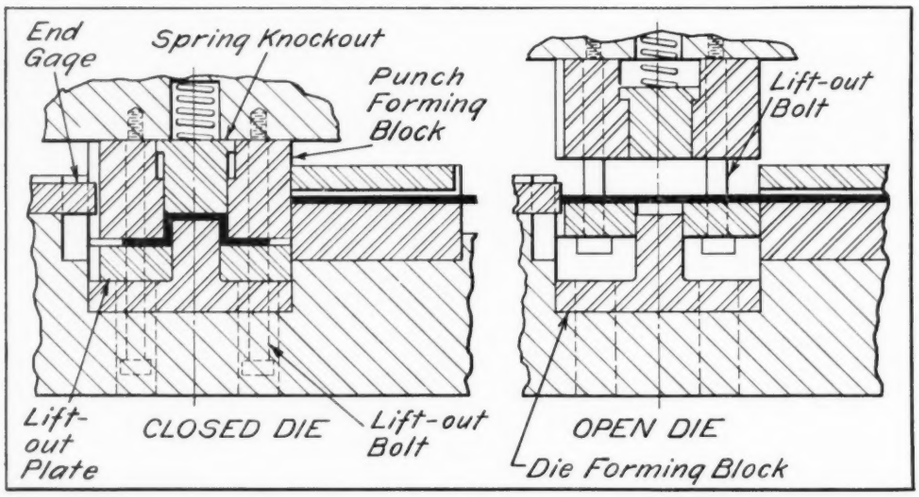


Fig. 9. Lift-out Type of Knock-out Incorporated in Cutting-off and Forming Die

shown in Fig. 6. The jet of air should be so aimed that the part is blown to the rear of the die.

Removing Finished Part by a Spring Pad

If the part is formed to such a shape that the stock is in contact with the cutting-off die and the end gage, after it is formed, it may be locked between these two parts of the die. In that case, air will not blow the part off the die; but the die forming block or some part of it may be arranged as a spring pad. This spring pad, as shown in Fig. 8, will release the part by carrying it up to the level of the cutting-off die edge. Spring plungers may be used instead of mounting all or part of the forming die on springs.

When the part is carried up by a spring pad or spring plungers to the level of the top surface of the cutting-off die, it no longer has a press fit between the cutting-off die and the end gage. An air blow-off can now be used to blow it off the die. If an inclinable press is used, the air jet is not necessary.

If the part is of such shape that it will stick to the punch, it may be carried up with the punch on the up stroke until it is released by the positive knock-out of the press (see Fig. 7). If the finished part does not stick in the punch, spring fingers may be used. These are mounted on the punch-shoe and pick up the part by friction.

If the die is used in an inclinable press, the press should be tipped toward the rear from 30 to 45 degrees, so the part will not fall back on the die. The stock strip should be fed from right to left in an inclinable press; if it is fed from front to back, the stock strip will extend too far up in the air.

If the die is used in a non-inclinable press, the part may be ejected from the die after it has been stripped from the punch by a jet of air or by a spring plunger on the punch-shoe. This spring plunger operates sidewise and exerts a continuous side pressure on the part. When the part is released at the top of the stroke, the spring plunger gives a side motion to the falling part.

Finished Part Removed by Lift-Out Knock-Out

A lift-out knock-out may be used to raise the finished part to the level of the cutting-off die, so the part can be easily blown or slid out of the die. It serves the same function as a spring-operated knock-out, but is lifted by bolts in the punch-shoe. The lift-out bolts do not operate the lift-out plate until close to the end of the up stroke, as shown in Fig. 9. The part may then slide off the die, if it operates in an inclinable press, or it may be blown off by a jet of air.

A lift-out has the advantage over a spring knock-out in that there is no spring pressure to exert a drag on the blank as it is being formed to shape. This might cause a shift in the blank if the drag on each side of the part is not equal.

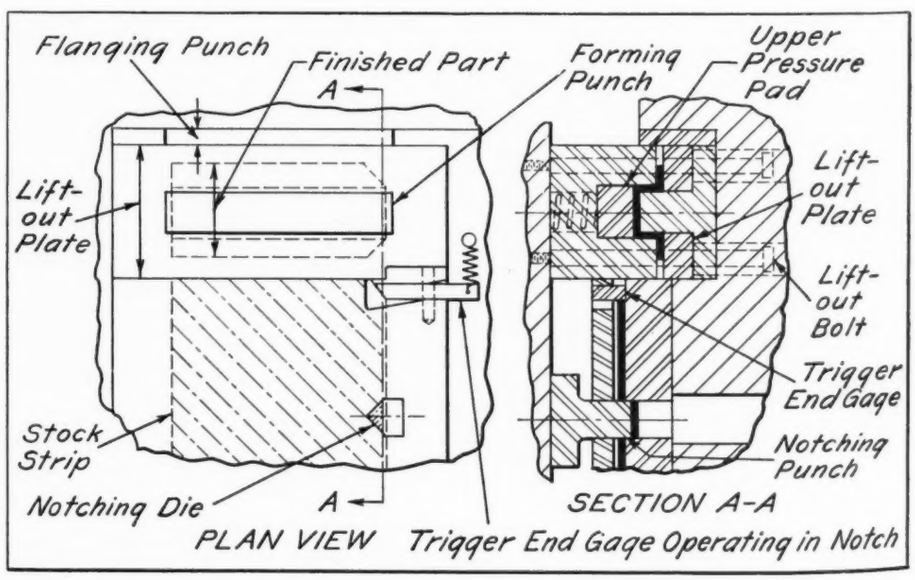


Fig. 10. Die Equipped with Trigger Type End Gage

If a spring knock-out is used in the punch-shoe to strip the part out of the punch, as shown in Fig. 9, the use of a lift-out plate instead of a spring knock-out plate in the die has another advantage. With a spring knock-out, a part of light gage stock would be distorted on the up stroke. The upper spring pad would be pushing the part down and the lower spring knock-out would be pushing it up. This action would flatten out the part on the up stroke to some extent, and this would be avoided if a lift-out knock-out without springs were used.

If the part, after being lifted, is too heavy for an air jet to blow off, the incoming stock strip can push the formed part off the die, provided a solid end gage does not prevent this (see Fig. 10). To avoid using a solid end gage, a notching die can be added on one or both sides of the stock strip in the first stage, and a trigger gage can be used in each notch in the second stage. Then the part can be cut off and formed in the third stage without the need of an end gage. The general principles of the trigger gage have been explained in a previous installment. (See MACHINERY, September, 1938, page 34.)

A Proposal for Fair Labor Relations

WE recently received a letter from a manufacturer from which the following paragraphs are quoted:

"As you perhaps know, we have worried through a strike during the past few weeks. I say 'worried,' because it is advisable for a manufacturer to have but little to say when he deals with outside business agents and has contacts with the National Labor Relations Board. All that he says is then subject to interpretation, and anything he says, even though of the mildest nature, may be misunderstood.

"During twenty years' experience in managing a business, through good times and through depressions, the writer has known of nothing that required more careful handling than this matter of labor relations. Our strike is over and we are still operating an open shop; the strikers have been taken back to work. This may be unusual, compared to the customary ending in matters of this kind, but we have endeavored not to interfere with our employes' free choice of the labor organization they wished to represent them, and we have not, in order to avoid labor trouble with a certain union, required the employes to join that union. All of our regular workers have expressed themselves to the effect that they have been satisfied right along and that they wish to join an organization of their own making and choosing.

"As a result, however, we are now subject to unfair labor practice charges and are having extended conferences with the National Labor Relations Board.

"Because of our experience, we are inclined to endorse a proposal that has been made by Marshall A. Pipin, a prominent young Chicago attorney. We believe that conditions could be established that would be fairer to both employers and employes than those now existing. The principal points of the proposal referred to may be briefly outlined as follows:

1. Before any strike may be called, all employes involved, whether union or non-union, must be given an opportunity to vote on the question.

2. Before a strike may be called, there must be a majority vote in favor of the strike.

3. If a majority vote favors the strike and it is called, then the employer must shut down the plant, except for such service as is necessary to prevent deterioration.

4. During the progress of the strike, a vote of all the employes must be taken at stipulated intervals, to determine whether the employes themselves wish to continue the strike or wish to return to work.

5. A majority of all employes voting in favor of returning to work terminates the strike.

6. Public officials shall be charged with the duty of preventing all interference with the work in plants where the requisite vote in favor of a strike has not been obtained; of enforcing the closing of plants during an authorized strike; of protecting the reopening of a plant when authorized by the requisite vote; of preventing an unauthorized opening of a plant; and of protecting persons and property on both sides during the strike. (Industries which are a public necessity might well be excluded from the application of this plan.)

"This proposal is a compromise of firmly established principles, but a consideration of the practical effect seems to justify the plan. The main point is this: Under this plan, both employer and employe receive proportionate benefits for the rights they have surrendered. The minority must abide by the will of the majority, as in any election. For the right denied the employe to participate in a minority-called strike, he is compensated by the guarantee that the employer will close his plant during a majority-called strike. The employer, on the other hand, is compensated for the right denied him to keep his plant in operation during a majority-called strike by the guarantee that he need not suffer loss or damage to production from a minority strike. The plan would reduce the strike to its basic principle, with fairness to both sides. It might well be supplemented by a provision for mediation and other measures aimed at a voluntary settlement before the calling of a strike."

Oil Lubrication of Anti-Friction Bearings

Recommendations for the Lubrication and Maintenance of Anti-Friction Bearings Applied to an Enclosed Oil-Lubricated Gear Unit

By F. RICHARDZ
Development Engineering, Gearing Division
Westinghouse Electric & Mfg. Co.
Pittsburgh, Pa.

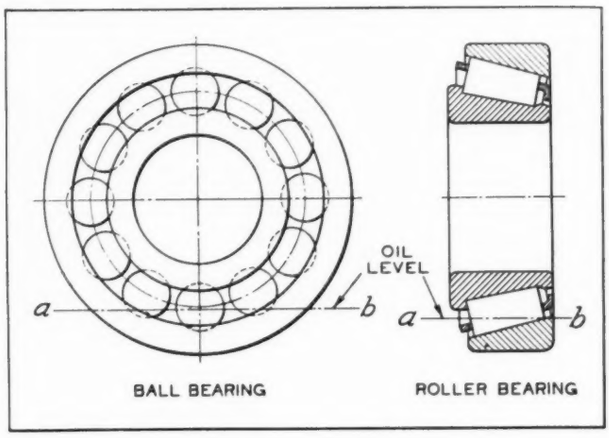


Fig. 1. Diagrams Showing Oil Level for Ball and Roller Bearings

THE lubricating medium for anti-friction bearings may be either oil or grease, depending upon the particular facilities provided for by the manufacturer of various types of equipment. Ordinarily, in enclosed gear drives, the lubricant for the bearings is the same as that used for the gearing. The life of gears and bearings and trouble-free operation are dependent, to a great extent, upon the lubricant selected. No matter how well the unit is built by the gear manufacturer, it cannot be expected to perform satisfactorily unless the lubricant selected is suitable for the particular application for which it is intended.

Proper lubrication involves more than just the selection of a particular viscosity in seconds Saybolt; consideration must also be given to the suitability of the oil at various operating temperatures and the conditions under which the units operate. For example, if the equipment operates in moist atmospheres, a sulphurized oil should never be used. Recommendations for suitable lubricants will be made by most manufacturers of equipment, as well as by practically all major refiners.

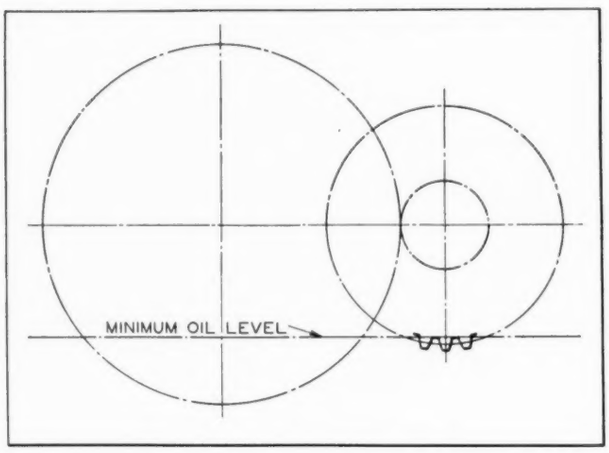


Fig. 2. Minimum Oil Level Required for an Enclosed Train of Gears

Since the majority of gear units employ the same lubricant for the gears and the bearings, it may be said that the function of the lubricant is (a) to minimize friction between the mating gear teeth and, in general, between all moving parts; (b) to have sufficient film strength to prevent scoring or galling of the gear teeth; (c) to dissipate heat; (d) to reduce the internal friction in the bearings; and (e) to prevent rust and corrosion.

It is essential that the oil used for anti-friction bearings be a high grade, high quality, well refined petroleum oil. It should have high resistance to oxidation and should be of low acidity and free from foreign solid matter, such as asbestos, mica, zinc, etc. Regardless of how fine the particles may be, they are still of an abrasive nature and should never be used in a lubricant, especially in one employed for anti-friction bearings. Continued use of lubricants containing solids will result in the lapping of the balls or rollers and races, causing premature bearing failures.

The Amount of Lubricant to be Used

In lubricating anti-friction bearings, it is desirable to employ the least quantity of oil or grease that will insure that all surfaces of the bearing are protected. The rotation of the bearing serves to pick up and distribute the lubricant over the component parts. An excess of lubricant is detrimental, inasmuch as it leads to undue friction through churning and results in heating of the bearing. This condition is directly opposite to that met with in the lubrication of plain bearings.

The height of the oil level in anti-friction bearings should generally be at about the center of the

lowest ball or roller, as indicated at *ab* in Fig. 1. The minimum oil level for gearing is obtained when the smallest gear dips into the lubricant an amount equal to the full depth of the gear tooth, as indicated in Fig. 2. In gear units, it is desirable to keep the oil level as low as possible, so as to prevent excessive churning and loss of power.

The Importance of Lubrication in the Maintenance of Anti-Friction Bearings

The point of greatest importance in the maintenance program is to assure an adequate supply of clean, suitable lubricant. It is particularly important when bearing housings are disassembled that the bearing be protected from grit and dirt. The bearing should never be handled carelessly, but should be wrapped in clean oil paper until ready for reassembling. Immediately before reassembly, the bearing should be thoroughly cleaned in a suitable solvent to remove gummy oil film and gritty dust; in order to prevent any corrosion due to the cleaning solvent, the bearing should be sprayed or flushed with a good grade of light lubricating oil. The lubricant should be maintained at the specified height. It is, therefore, necessary occasionally to check the oil level and replenish if necessary.

Do not mix lubricants—always use the brand originally employed. To obtain the best results, it is recommended that the lubricant be changed, or at least filtered, after one month's initial service, and approximately every six months afterward, as wear of the moving parts may take place and dust and abrasive grit may enter the oil reservoir and form an undesirable sludge that will shorten the life of the equipment unless removed. This precaution will assure increased life of gears and bearings.

Congress Still Believes that Machines are Enemies of the People

THE Senate Joint Resolution No. 3, authorizing and directing the Secretary of the Treasury to make an investigation of labor-saving and labor-displacing machinery, reads as follows:

"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, that the Secretary of the Treasury is authorized and directed to conduct an investigation of the desirability and practicability of the imposition of a tax on the use of labor-saving and labor-displacing machinery and to report the conclusion of his investigation, together with any relevant and useful data obtained in connection therewith, to the Congress at the beginning of the second sessions of the Seventy-sixth Congress.

"In connection with such investigation, the Secretary of the Treasury is authorized and directed to call on any other department, bureau, or agency of the Government for any information in their possession which may be pertinent to such investigation, and the heads of such departments, bureaus, or agencies are hereby authorized and directed to furnish such information to the Secretary of the Treasury."

Every intelligent man engaged in the operation of machinery knows that machines have been the means of greatly facilitating the production of all the things that men use for their convenience and comfort in life. They also know that the tasks of the workers have been made far more easy to perform, that working hours have been reduced, and that wages have been increased through the productive possibilities introduced by the machine. They know, further, that there is already available an abundance of published material to support these statements. It is only necessary for the Treasury Department to collect and present already available data, without engaging in a costly investigation at the taxpayers' expense.

It is of great importance, therefore, that men in the mechanical industries who recognize these facts should immediately communicate with their Senators and Congressman, pointing out the folly of the imposition of a tax on the very thing that has removed drudgery from modern life. The entire structure and well being of our present-day national life rests upon the machine. This fact should be impressed upon our lawmakers.

* * *

Machines and Progress

An informative and comprehensive chart entitled "Machines and Progress" has been prepared by L. A. Wilkie, president of Continental Machines, Inc., 1301 Washington Ave. South, Minneapolis, Minn. This chart shows in a graphical manner how the standard of living in the United States has been directly fostered by the use of machinery. The important part played by inventions is also emphasized. For example, the number of patents issued during each year since 1890 is prominently displayed. The chart further gives the number of employes, the wages paid, and the value of the output in all of the outstanding industry groups of the United States. It also points out how the Government at the present time takes 28 cents in taxes out of every dollar earned. The chart is intended for use as a wall chart or to be placed on a bulletin board. It can be obtained by addressing Continental Machines, Inc.

Engineering News Flashes

The World Over

New Type of Railroad Brake Stops High-Speed Trains Rapidly

A new type of railroad brake that will bring high-speed trains to a smooth stop within 2500 or 3000 feet when running at 100 miles per hour has been announced by the Budd Wheel Co. This distance is said to be about one-half that now required to stop a train running at such a speed.

The new system represents a complete change in design from the conventional brake, with its metal shoe working against the rim of the wheel. It is somewhat like the type of brake used in automobiles in that a composition shoe is used. This shoe exerts pressure upon an air-cooled disk or drum, mounted on the axle inside the wheel. Fins attached to the disks quickly throw off the heat generated in the braking operation. Special automatic control devices are provided to prevent the wheels from sliding when the brakes are applied suddenly; hence flat wheels are eliminated. The first complete train to be equipped with the new brakes is the *General Pershing Zephyr*, of the Burlington Lines.

Producing More Power with Less Coal than was Formerly Required

Public utility power plants now require close to 50,000,000 tons of coal annually for their operation, but that amount is only half of what would have been needed by the equipment of twenty years ago in producing the same amount of electricity. This statement was made by W. E. Blowney, turbine engineer of the General Electric Co., in speaking to graduates at Annapolis.

Mr. Blowney described the improvements that have doubled the energy output, or halved the fuel consumption, of steam turbines during the last twenty years. An average 30,000-kilowatt steam turbine plant in 1918 required about $3500 worth of coal for each day's operation. Today, an average modern turbine plant of the same size requires only $1450 worth of coal to produce the same amount of electricity. The most efficient 30,000-kilowatt station in 1918 daily consumed $1670 worth of coal; the most efficient station today requires $900 worth of coal to produce the same results.

Primarily responsible for the savings are the higher initial steam pressures and temperatures that can be used as a result of the advances made in turbine design and construction. Much of the improvement in power generating equipment is due to a better understanding of the properties of alloy steels. Most present-day turbines also operate at higher speeds which improves the efficiency and reduces the size of equivalent units. The rapidly increasing use of hydrogen cooling for turbine generators also represents a big advance in the power industry.

Gear Noise Damped out by a Welded Iron Ring

At the Westinghouse exhibit at the New York World's Fair there are two standard street car gears, identical except for the fact that one has a thin band of steel welded on the inside of the rim. These gears are used to demonstrate how noise can be damped out in gearing. The noise made by the gears and pinions of street car drives is familiar to everyone. By welding a thin band of steel on the inside of the rim at three or four points, the vibration caused by each blow on the teeth when the gears are running is taken up, and the resonance or noise is damped out. The ring must be welded to the gear at just the right number of places—neither too few nor too many—or else the vibration will not be damped by the ring, as it will react equally with the gear.

A Non-Magnetic Ship Built in Great Britain

The *Research*, a sailing ship recently built for the British admiralty for magnetic survey work at sea, is said to be the only vessel of its kind afloat. It is constructed almost entirely of wood and bronze, the hull being built of wood, with bronze propeller frame and propellers. The engines that have been installed for auxiliary power contain a minimum of ferrous parts in their assembly; in fact, only 0.5 per cent of the metal used is iron or steel. Every detail of the ship's equipment and fittings has been studied with a view to eliminating iron and steel.

This unique type of construction was necessary for the successful operation of the delicate instruments that the ship carries for recording compass variations and making meteorological observations. All food placed on board ship is stored in casks and glass jars; cooking utensils of aluminum are used. Even the paper clips used in the ship's office are of a non-magnetic metal. The crew's personal equipment is examined, so that no magnetic material will be introduced.

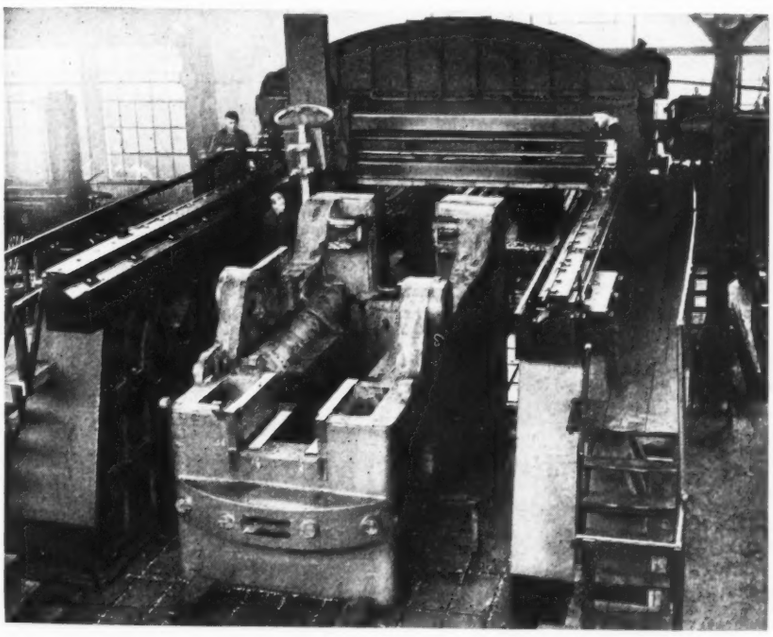
Reducing the Dead Weight and Increasing the Payload

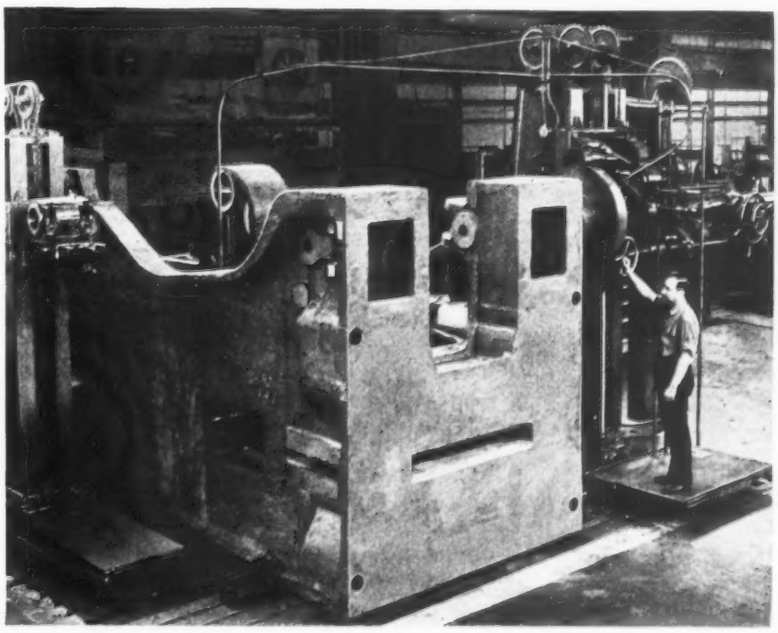
According to Charles B. Bohn, president of the Aluminum Association, a modern transport plane such as the 21-passenger plane now used on a prominent airline, weighs only 8 pounds for every pound of payload. This plane weighs 24,000 pounds and can transport a load of 3000 pounds. On the highways, the weight of the average commercial automobile has been reduced as much as three-quarters of a ton by simply changing to aluminum alloys and using modern methods of design. A bus manufacturer has saved a dead weight equivalent to that of forty passengers and their baggage through the use of light alloys. The day of needlessly heavy materials has passed.

Fibers 0.0002 Inch in Diameter Regularly Spun from Glass

Fiber glass promises to revolutionize many fields of insulation, construction, and industrial design, according to F. W. Atkinson, research engineer of the Owens-Corning Fiberglas Corporation, Toledo, Ohio. Glass fibers are produced in two distinct types—staple length and continuous. The former are comparatively short fibers, from 8 to 15 inches long, and approximately 0.00025 inch in diameter. Fabrics made from these short fibers resemble cotton or woolen yarns. The continuous fibers, as their name implies, are produced in continuous lengths, limited only by the size of the spools on which they are wound. Their diameter averages about 0.0002 inch.

In the manufacturing process, the fine glass strands are placed on textile spinning machines, where the yarn is spun in the same manner as cotton or wool yarn. The yarn for fabrics produced from continuous fibers resembles silk or rayon in appearance. Glass fibers of diameters such as are used in making textiles for electrical insulation have extremely high breaking strength. The strength of individual fibers 0.0002 inch in diameter has been shown to exceed 1,000,000 pounds per square inch. No other textile fiber approaches this strength. Tests also show that woven glass fabric is stronger than other textile fabrics. These fibers are made from 3/4-inch glass marbles. One marble makes a fiber 0.0002 inch in diameter 98 miles long. One pound of marbles makes 5000 miles of fiber.





Machining the Huge Frames of 2000-ton Capacity Forging Presses Built by the Ajax Mfg. Co., Cleveland, Ohio. These Frames are One-piece Steel Castings Weighing 100 Tons. The Planing (Above) is Done on a Floor Type Planer Designed and Constructed by the Ajax Mfg. Co. for its Own Use. The Illustration to the Right Shows the Boring and Drilling of a Frame on a Large Niles Boring Machine

EDITORIAL COMMENT

To most people, the New York World's Fair is a vast entertainment, a collection of odd and fascinating buildings in a beautiful setting, and a supreme example of the art of the illuminating engineer. To the mechanically minded man, the Fair is a great deal more than that, because there, within the compass of a few hundred acres, are more evidences and examples of the engineer's achievements than have ever before been collected in such a small space.

The exhibits of the leading automobile companies are most closely connected with the work of the machine shop and the machine builder. In the Ford exhibit, automobile parts are actually being manufactured and inspected in the same manner as they are at the great Ford manufacturing plants. The General Motors exhibit provides an opportunity to examine in detail a great many of the important parts that enter into automobile manufacture. The lecture on engineering achievements in the General Motors Auditorium is alone worth the price of admission to the Fair. The Chrysler exhibit gives the visitor an opportunity to observe at close range some of the important principles upon which automobile design and manufacture are based. The engineering of rail transportation has never been better depicted than in the section of the Fair devoted to railroad exhibits, and the hall devoted to aircraft contains enough of interest to keep an engineer occupied for at least a day.

Engineering as Seen at the World's Fair Exhibits

The same may be said of a score of other outstanding exhibits—the General Electric building, the Westinghouse and the Link-Belt displays, the offerings of the Electric Utilities, the Hall of Metals, the Industrial Science building, and the exhibits of the United States Steel Corporation, Du Pont, and Carrier—to mention only a few of interest to the engineer.

The comparison between the Street of Yesterday and the Street of Tomorrow in the Electric Utilities display cannot help but make every thinking man and woman realize what engineering and machine building have done for the comfort and convenience of everybody during the last fifty years. Were but half the possibilities in evidence in all the show buildings made use of in a practical manner, there would be no unemployment in the United States for the next twenty years, and a standard of living undreamed of at the present time would be the heritage of our nation.

Mankind in general has a right to be proud of its achievements as exhibited at the Fair, but no class has a greater right to be proud of what it has done than the manufacturer and the engineer, because between them is divided the honor of having provided the greatest part of all that is of outstanding value and interest at the Fair. If proof were necessary that these two classes of human society have provided the means whereby all the rest may live in comfort, free from anxiety, the proof is there. If other classes of society are not willing or able to make use of the facilities provided by industry and engineering, they should at least not blame industry for their own negligence.

Industry Has a Right to be Proud of its Achievements

The orators and would-be saviours of humanity who harangue their listeners over the radio on the danger of the machine to American workmen forget that they, themselves, would be unable to reach their audience except for the machine. They speak into a machine-made microphone, and their words are transmitted through a machine-made broadcasting station and reproduced to the listeners by machine-made radio receiver sets. Without doubt, these speakers arrive at the broadcasting studio in an automobile—a machine made by other machines. Their houses are heated and lighted by equipment made by machines. They eat food brought to them from all the corners of the earth by machines, cooked on a stove made by machines. All the conveniences that they enjoy are made possible by machines. They travel about the country in machines made by other machines—and yet they stand before the microphone denouncing the very thing that has made their life comfortable and livable—the machine.

They Use the Machine in their Effort to Decry the Machine

Ingenious Mechanical Movements

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and Other Devices

Quick-Rise Cam Lay-Out Developed to Prevent Shock in Operating a Mechanism

By MARTIN H. BALL

The cam lay-out illustrated was made to prevent shock to the mechanism at the beginning, the changing, and the ending of the movements. It was required that the rise take place in about half the time used for the fall, and that there should be a dwell of 115 degrees between the fall and the next rise of the cam. The rise was to have as great a pressure angle as would be consistent with the load to be carried.

With the circle laid out in 5-degree steps, the 3/4-inch diameter roll follower is started with a harmonic motion acceleration of 2, 8, 22, and 30 degrees pressure angle. It is apparent that the speed accelerates, but the pressure angle of 30 degrees continues until the point of receding, which is in the reverse order of that at the rise, then proceeding with 2, 5, 12, and 19 degrees fall until the decelerating point occurs, at which the same figures are used in the reverse order. The cam rotates in a counter-clockwise direction.

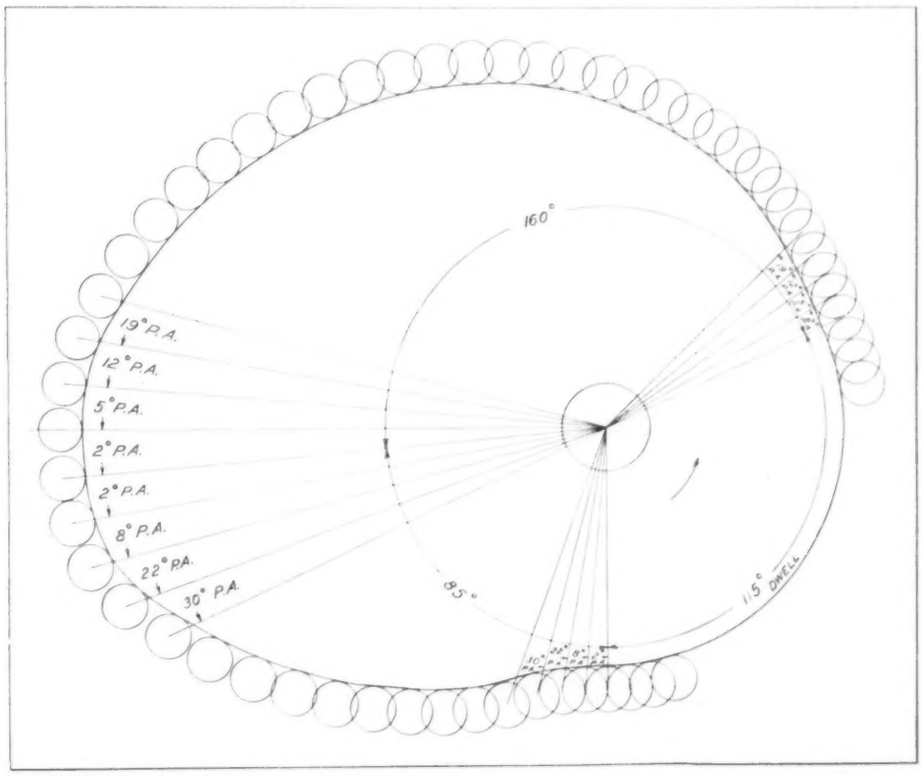
The rise was required to be made quickly. This fact led to the rather unusual method of locating the 5-degree spaced centers for the roll follower by using pressure angles instead of the more common method of stepping off the points from the common center of the cam, which would give the cam an even time rise throughout, except during the accelerating period at the beginning, and during the decelerating period. The latter method could not be used in this case, as there was not room enough to swing so large a cam as would have been required.

Roll-Driving Mechanism that Stops Automatically in Case Material Breaks

By VINCENT WAITKUS

The mechanism here illustrated (see next page) was designed for unwinding thin tissue from large rolls. The problem was to provide suitable means for feeding the delicate, thin material, which is easily stretched and torn by improper handling. The arrangement shown provides for stopping the feed if the material breaks, and will also slow up the speed of the roll if the feeding rate becomes greater than the rate at which the material is consumed. Thus, the roll of thin material is kept under control at all times, so that the tissue is subjected to a minimum amount of tension.

The two fork-shaped side frames *A* are bolted to a baseplate *B*. They support two feeding rolls *C*, mounted on shafts *D*, to which they are fastened by taper pins *E*. Rolls *C* are provided with molded rubber covers *F* to increase the driving friction.



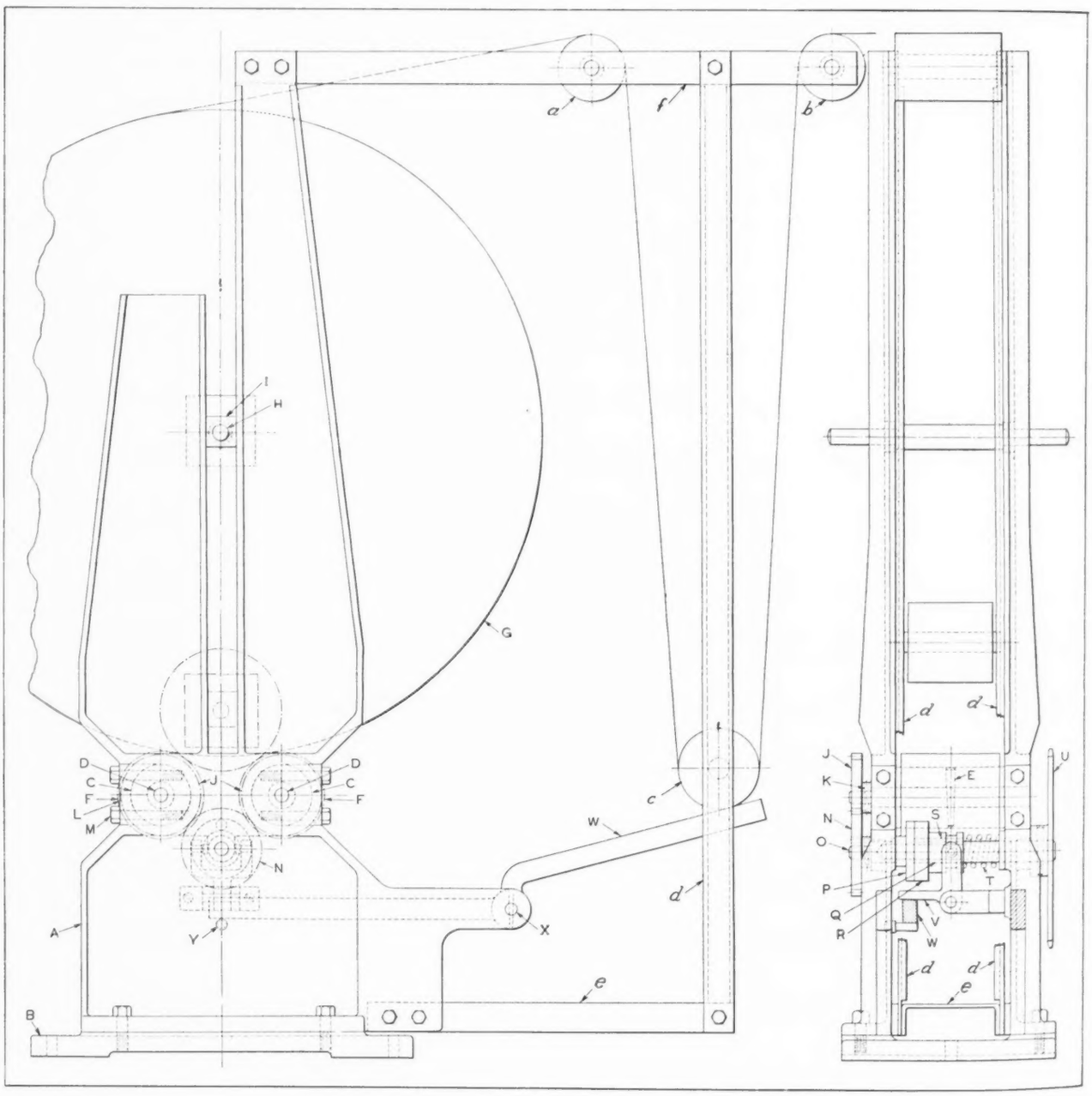
Lay-out for Cam Designed to Prevent Shock and Yet Provide Quick Rise

The roll of tissue *G* is kept in position by shaft *H*, which is fitted in bushings *I*. The bushings are arranged to slide freely in the vertical slots in the side frames *A*.

Mounted on each of the feeding roll shafts *D* is a spur gear *J*, fastened in place by a taper pin *K*. Bearing blocks *L* are so constructed that the feeding roll assembly can be removed by unscrewing bolts *M*. Driving gear *N* of the feeding control mechanism is fastened to stub shaft *O* by a taper pin. The driving gear meshes with the feeding roll gears *J*. Clutch member *P* is fastened to stub shaft *O*, in which there is a bore that supports the end of driving shaft *Q*. The driving shaft is thus supported between the stub shaft and a bearing in the side frame *A*. Clutch member *R* slides on shaft *Q*, guided by key *S* under the action of spring *T*. Driving sprocket *U* is fastened to shaft *Q*.

Yoke *V* of the clutch-actuating mechanism is equipped with pins which fit into a groove in clutch member *R*. The yoke is supported by a bracket fastened to side frame *A*. Tripping bar *W* is pivoted on shaft *X*, which is supported in bearings provided in side frames *A*. The tripping bar is balanced, so that it rests on pin *Y* in the side frame.

The thin tissue material is guided over a series of three rolls, the positions of the two rolls *a* and *b* being fixed. The third roll *c* is free to move up and down in the side members or guides *d*. Guides *d*

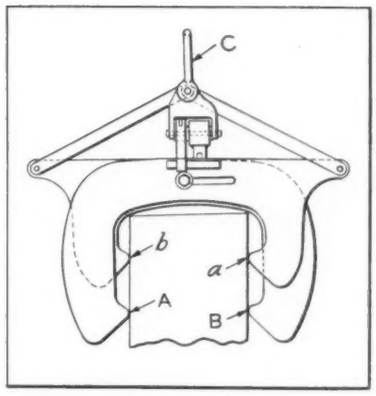


Power-driven Mechanism for Unwinding Thin Tissue from Roll G which Stops if Material Breaks or if the Feeding Rate Exceeds the Rate at which the Material is Used

are fastened to horizontal members *e* and *f* which are, in turn, fastened to side frames *A*.

The operation of the unwinding mechanism is as follows: Sprocket wheel *U* actuates driving gear *N* through clutch members *P* and *R*, thus rotating feeding rolls *C*. The feeding rolls, in turn, rotate the roll of tissue, the entire weight of the material being supported by the feeding rolls. The tissue passes over guide roll *a*, under movable guide roll *c*, and up over the fixed guide roll *b*. In actual operation, movable guide roll *c* is raised from tripping bar *W*.

If the tissue is broken or ruptured, movable guide roll *c* comes to rest on tripping bar *W*, causing it to raise the opposite end from pin *Y* and make contact with yoke *V*. This action causes the yoke to draw clutch member *R* away from member *P*, thus stopping the feeding rolls. The same action takes place when the rate at which the material is being fed becomes greater than the rate at which the material is consumed. In such cases, movable guide roll *c* will fall on tripping bar *W*, causing the feeding rolls to stop and thus stop the rotation of the tissue roll *G*.



Clamping and Lifting Device Designed to Grip Work at Four Different Points

Four-Point Contact Clamping and Lifting Device

By PAUL GRODZINSKI

A clamping and lifting device with four gripping points which will not let the work fall if the lifting force is momentarily released is shown in the accompanying illustration. With this device, both a direct clamping action and an "edging" action are applied simultaneously for holding the work. The mechanism consists of two clamps, each having a two-point contact with the work. The two contact points of each clamping member grip opposite sides of the work, one clamp making contact at points *A* and *a*, while the other makes contact at points *B* and *b*.

The opposite ends of the clamps are held in the usual way by two levers connected to a hook *C* used for lifting purposes. Between the hook-plate and clamps is located a releasing device which can be employed to hold the clamps in the open position for gripping a new piece of work. This mechanism is utilized in various forms for clamps and pliers by Ludwig Bönnhoff, Wetter/Ruhr, Germany.

Distinction Between "Suppressed" and "Unused" Patents

In a normal year, about 50,000 patents are granted by the United States Patent Office. A large proportion of the inventions covered by these patents are never applied commercially. This has led to the widespread belief that patents are acquired by corporations, in some cases, with the express purpose of putting them "on the shelf."

According to the *Industrial Information Bulletin*, published by the National Association of Manufacturers, the following are some of the reasons why a patent may remain unused: (1) There may be no market for the invention. Edison's electric lamp could not be used commercially until economical methods had been developed for generating current. (2) The purpose of the invention may be better accomplished by a previously patented invention; hence, it may be at a competitive disadvantage. (3) Capital for its exploitation may not be readily obtainable.

Thomas A. Edison once said: "I have heard and read numerous statements to the effect that many corporations buy valuable inventions to suppress them; but no one cites specific cases. Before any changes in the law are made, the objectors should cite instances where injustice has been worked on the public by the alleged suppression of patents."

Industrial Machinery Exports Continue at High Levels

Exports of industrial machinery from the United States during the month of May, the last month for which complete statistics are available, were valued at approximately $26,000,000, as compared with $23,500,000 during May, 1938, an increase of 11 per cent, according to data collected by the Machinery Division of the Department of Commerce, Washington, D. C.

The exports of power-driven metal-working equipment reached $11,616,000 in May, the second highest monthly figure on record, exceeded only by March of this year, when a total of $12,057,000 was reached.

* * *

It takes not only a reasonably good invention to be the basis of a commercial success, but also a pretty good business man to make something out of the invention. Those inventions that fail although they are really meritorious fail primarily because of the lack of business ability on the part of the inventor. Often it is his obstinate refusal to cooperate with business men in the promotion of his invention that leads to his permanent failure and disappointment.—*H. A. Toulmin, Jr.*

Metal-Working Operations in

The Exhibit of the Ford Motor Co. at the New York World's Fair Pays Tribute to Metal-Working Machinery as the Basic Foundation of the Automobile Industry

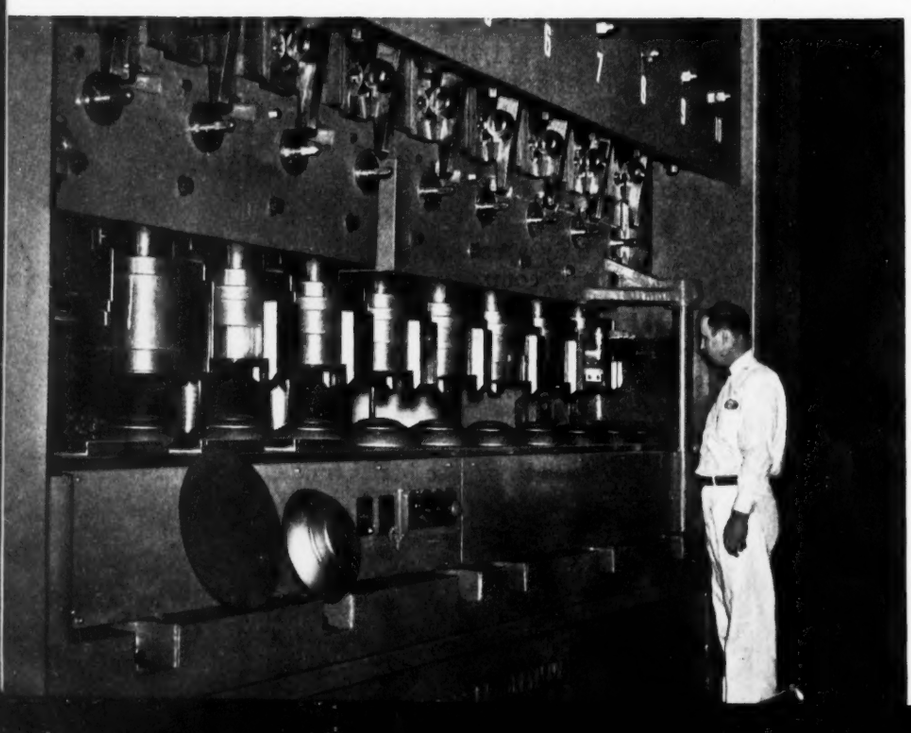
By CHARLES O. HERB

Fig. 1. Close-up View of a 700-ton Capacity Press which Produces Hub-cap Inner Shells at the Rate of Twelve a Minute

ONE of the most popular exhibits at the New York World's Fair is that of the Ford Motor Co., as indicated by the fact that more than one-third of the millions of visitors to the Fair pass through the Ford building—25,000 an hour during peak periods. A striking feature of this exhibit is a turntable 100 feet in diameter by 30 feet high on which dozens of animated figures give graphic pictures of the processes by which raw materials from all over the world are converted into automobiles.

This turntable, which is arranged in setback layers, like a huge wedding cake, weighs 152 tons. The engineers faced a difficult problem in devising a means of rotating it noiselessly and without excessive expenditure of power. This was accomplished by the ingenious method of floating it on a moat of 20,000 gallons of water, so that only a 2-H.P. motor is required to revolve the huge display. The first time that the turntable was operated, when the Fair opened, it was started by the electrical energy given out by an electric eel borrowed from one of the other exhibits.

Of even greater interest to mechanical men, however, is the impressive exhibit of metal-working machines producing actual automobile parts. The theme of this exhibit is "Industrial Machinery Creates Employment." One sign points out that if a Ford V-8 were made by hand methods, it would cost $17,850, and there would not be a market for such a high-priced car. The sign further explains that only because of machinery can cars be sold at low prices and millions of workers employed by the automotive industry.



The Bliss press exhibited (Fig. 1), which has a capacity of 700 tons and a weight of over 300,000 pounds, exemplifies this economic principle. This press, with its ten sets of dies, cost $115,000, and yet is a profitable investment because it produces twelve hub-cap inner shells a minute at a cost of twelve cents. By hand methods, a man could shape only two of these shells a day, at a cost of $2.50 each. The press stands 22 1/2 feet above the floor and extends 9 feet beneath. The width between uprights is approximately 14 feet. Guides explain the various machine operations in an unusually clear manner.

"The World of Tomorrow"

Disks of No. 22 gage steel, 16 3/8 inches in diameter, are fed automatically to the first die at the left-hand end of the press. When the blank reaches this die, it has been automatically coated with a lubricant by an overhead spray gun to facilitate the press operations. The first die draws each blank to a depth of about 5 inches as the upper die member is lowered mechanically on the blank and a punch in the die-bolster is raised pneumatically to push the blank into the die impression. From the first die, the drawn shell is moved progressively to the succeeding dies and out of the press at the right-hand end. This is accomplished by a transfer mechanism that operates on top of the bolster.

The second set of dies trims the shell; the third forms a flange on the open end; the fourth, fifth and sixth bend under the open end of the shell; the seventh restrikes the shell and forms a bead; the eighth and ninth curl the open end; and the tenth forms a recess on the dome portion for holding on an outer hub cap.

Split valve guides are cast on the revolving turntable shown in Fig. 2, which is equipped with eight stations that are indexed beneath an automatic sand rammer. These stations are alternately provided with drag and cope patterns. After each two stations leave the rammer, the cope is placed on the drag, a sprue hole is formed in the mold, and molten iron is poured from a hand ladle. Thirty-four valve-guide halves are made in one casting.

The iron is melted to a temperature of 2600 degrees F. in a Lectromelt furnace which operates on the electric arc principle. After the casting has cooled, it is sand-blasted, and the individual valve-guide halves are then broken off.

Two broaching operations are performed on the valve-guide halves by the continuous type machine illustrated in Fig. 3, which has a conveyor fitted with holders that carry the parts past stationary broaches. The broach teeth are provided with tungsten-carbide inserts. In the first operation performed in this machine, the valve-guide halves are broached on the flat joint surfaces and also in the hole that runs the length of each piece. The broaches are changed for the second operation, which consists of broaching the hole to the required diameter and straight within a tolerance of 0.0003 inch. Under actual shop conditions, these broaching operations are performed at the rate of about 3000 pieces an hour. The flat surfaces on the split guide valves are finish-lapped.

The valve-guide halves are next transferred to the Potter & Johnston machine illustrated in Fig. 4, which is provided with tools at the front and rear of the cross-slide. Two pieces of work are inserted in the collet chuck at one time, so that continuous cuts can be taken. As the tool-blocks are fed in successively, the parts are

Fig. 2. Molding Turntable Used in Conjunction with a Ramming Machine to Facilitate Casting Split Valve-guide Bushings

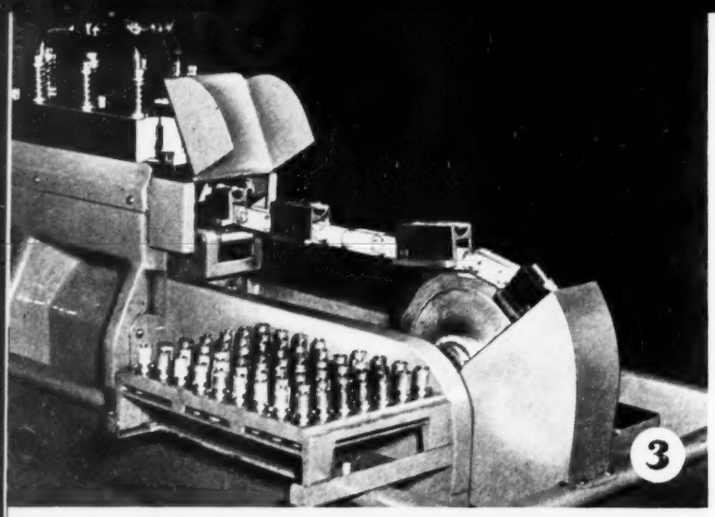


Fig. 3. Continuous Type Broaching Machine which is Used for Two Operations on the Split Valve-guide Castings

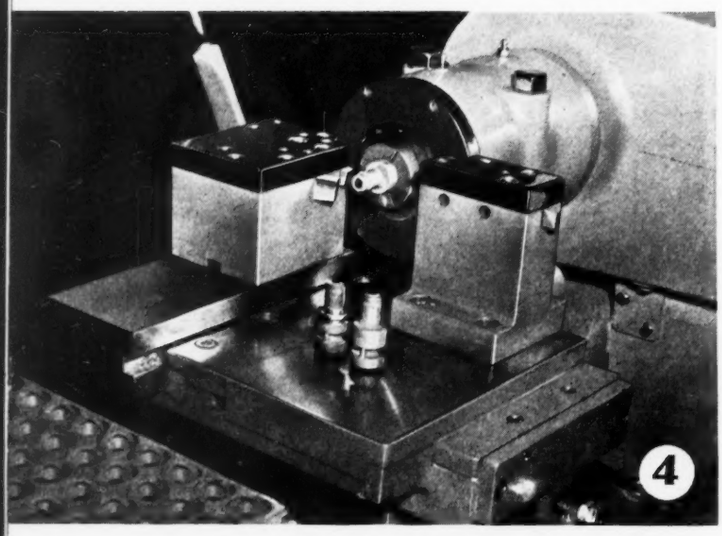


Fig. 4. Facing Split Valve Guides to Length and Taking Several Turning Cuts on which the Tolerance is Only 0.0005 Inch

faced to length and turning cuts are taken to form a retainer groove, spring seat, shoulder, and beveled back bearing. On these operations, the dimensions must be held within a tolerance of 0.0005 inch.

The Brown & Sharpe grinding machine shown in Fig. 5 then grinds two narrow cylindrical surfaces on two work-pieces mounted on an arbor which is held between centers. These diameters must be to size within plus or minus 0.00025 inch and they must be round within 0.0003 inch. An Arnold hydraulic gage equipped with two dial indicators gives readings of the work diameters during the actual grinding. Other gages are employed after the operation to check the ground diameters and their alignment with respect to the broached hole.

Bar stock for drag links is rolled from steel billets by the mill seen in Fig. 13, which is located in a section of the exhibit that shows manufacturing operations of Thompson Products, Inc. The 15-inch long by 1 3/4-inch square billets are first heated to 2200 degrees F. in an electric furnace and then rolled to a diameter of 23/32 inch and a length of approximately 9 feet. This is accomplished in eleven passes through the rolls of the mill.

After the rods have cooled off, they are cut to length by a friction saw and then taken to the National forging machine shown in Fig. 6, which is used for forming both ends of the drag links, as shown by the example at the front of the machine. As the dies must be changed for forging the opposite ends of these drag links, a considerable number of links are shaped on one end only before the machine is set up for forming the opposite end.

In forming the socket seen at the right-hand end of the sample, the bar stock is first held horizontally for an upsetting blow. The stock is then held vertically for two successive operations during which it is placed in different cavities of the die-block for piercing and forming. The opposite end of the drag links requires five operations—one upsetting, three piercing, and a trimming operation.

Fig. 7 shows a Niagara press in the same line-up of machines which is equipped with a set of

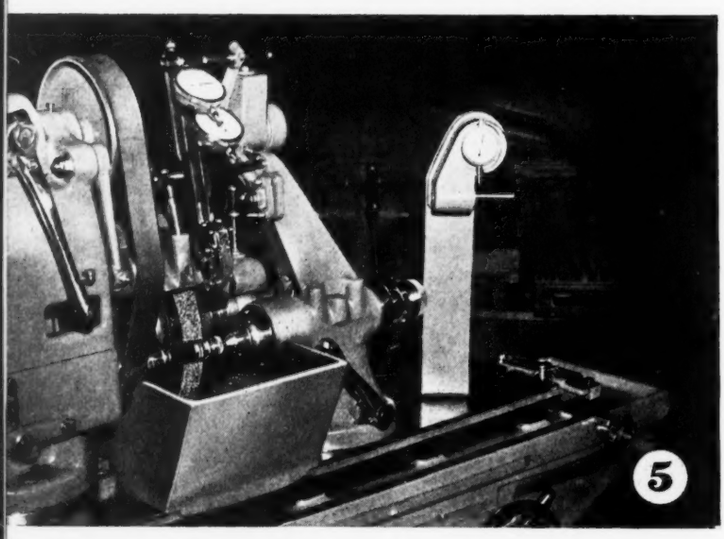


Fig. 5. Two Cylindrical Surfaces are Ground on Split Valve Guides in a Machine Equipped with an Arnold Hydraulic Gage

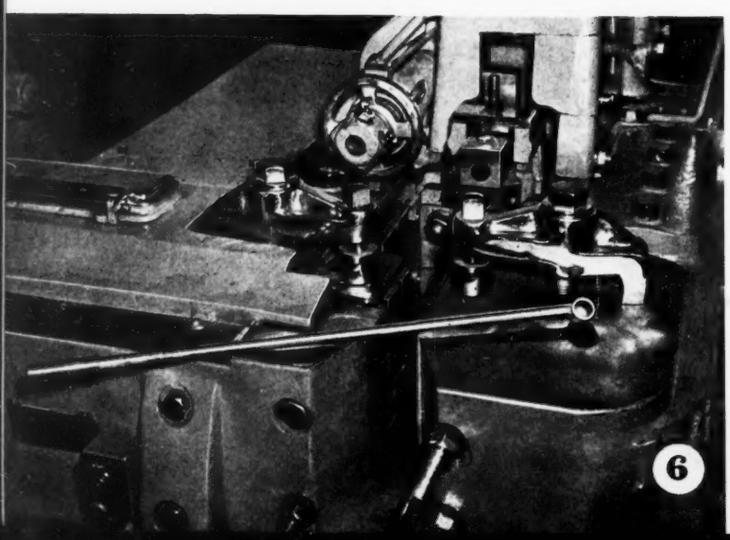


Fig. 6. Forging Machine Used for Forming Sockets on Both Ends of Drag Links by Employing Two Sets of Dies

Fig. 7. The Drag Links are Trimmed, Coined, Pierced, and Bent in Four Steps of the Press Operation Here Shown

Fig. 8. Rolling Stainless Steel Strip Stock into a Continuous Coil of Material that is Cut into Wheel Trim Bands

dies for trimming off the flash, coining a bearing seat or radius in the socket, piercing a hole of approximately 7/8 inch diameter to receive a ball, and bending a slight offset in the link immediately in back of the socket.

Wheel trim bands of 18-8 stainless steel are produced by a group of machines in the Lyon, Inc. section of the Ford exhibit. The first machine of this group, the Yoder forming machine shown in Fig. 8, takes coiled strip stock that has previously been notched along one edge and forms it to the desired cross-section by means of six pairs of rolls. A seventh pair of rolls shapes the formed stock into a continuous coil, as seen at the left. This operation is performed at the rate of about 110 feet a minute.

The continuous coil advances automatically along a horizontal reel to the small punch press shown in Fig. 9, where it is cut to the required length after first being looped around a flexible band that serves as a gage to insure the correct inside circumference. The flexible band considerably facilitates this operation, as it is easier to slip the coiled stock around a band that will conform to the stock than it would be to slide the stock around a rigid cylinder.

The ends of the wheel trim bands are joined in the Taylor-Winfield flash type welding machine shown in Fig. 10, which has a rating of 75 kilovolt-amperes. In this operation, the time of heat application is of utmost importance, because too long a heating period would cause oxidation and destroy the rustless properties of the steel, as well as give a weak weld. A mechanical timer equipped with Westinghouse Weldotrol tubes insures a heating period of about one-eighth second.

The weld is polished smooth on the Gardner two-wheel machine shown in Fig. 11, after which the entire band is buffed on a two-wheel "Rite-Speed" machine equipped with a cloth buff that is run at a peripheral speed of about 120 miles per hour. This buff is provided with a series of holes around the center for ventilating purposes.

There is also an impressive display of plastic molding in the Ford exhibit, one example of which

Fig. 9. Cutting the Coiled Wheel Trim Band Material into Required Lengths by Employing a Small Power Press

Fig. 10. Welding the Ends of a Wheel Trim Band together to Form a Continuous Piece, in a Welding Period Held to 1/8 Second

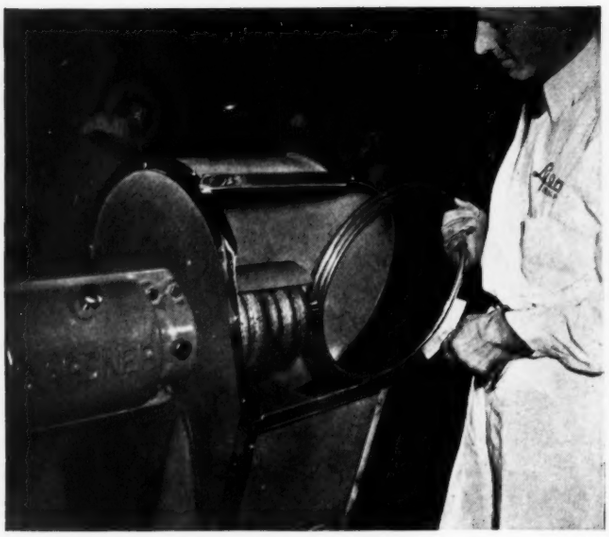


Fig. 11. The Weld of the Wheel Trim Bands is Polished Smooth on the Machine Here Shown prior to Buffing the Complete Band

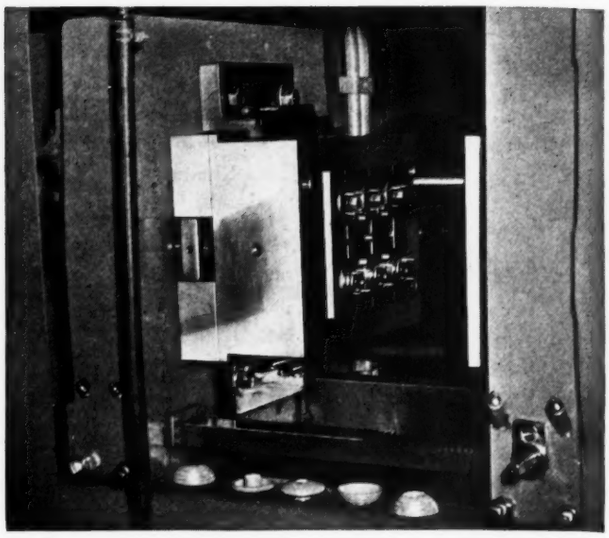


Fig. 12. One Half of the Mold in an Injection Type Molding Machine which Produces Both Halves of Gear-shift Lever Knobs

is shown in Fig. 14. This is a close-up view of the mold provided in a Baldwin-Southwark press that is used for producing accelerator pedals from soy bean pellets. Six pedals such as seen at the front of the mold are formed at one time when the lower mold section is raised into contact with the top mold section by hydraulic pressure. A pressure of 150 tons is applied and the molds are heated to approximately 330 degrees F. About three minutes is required for the operation. The soy bean pellets are 1 1/4 inches diameter by 5/8 inch thick, three being needed for each pedal.

Another example of plastic molding is illustrated in Fig. 12. Here is shown a Lester injection type machine which produces both halves of the gear-shift knobs seen at the front of the machine ways. Powder is forced into a heating chamber, where it is melted into a liquid and then forced into the cavities of the closed mold. The parts are automatically ejected from the mold when the machine opens. The operation takes about four minutes.

The Ford exhibit also includes a testing section, which is equipped with such machines as Tinius Olsen torsion, impact, and tensile testing machines, a Bausch & Lomb contour tester, a piston-pin inspection machine which automatically performs six different gaging operations, and a Tinius Olsen crankshaft balancing machine.

Fig. 13. Steel Billets are Rolled into Rods for Drag Links in Eleven Passes through the Rolls of This Mill

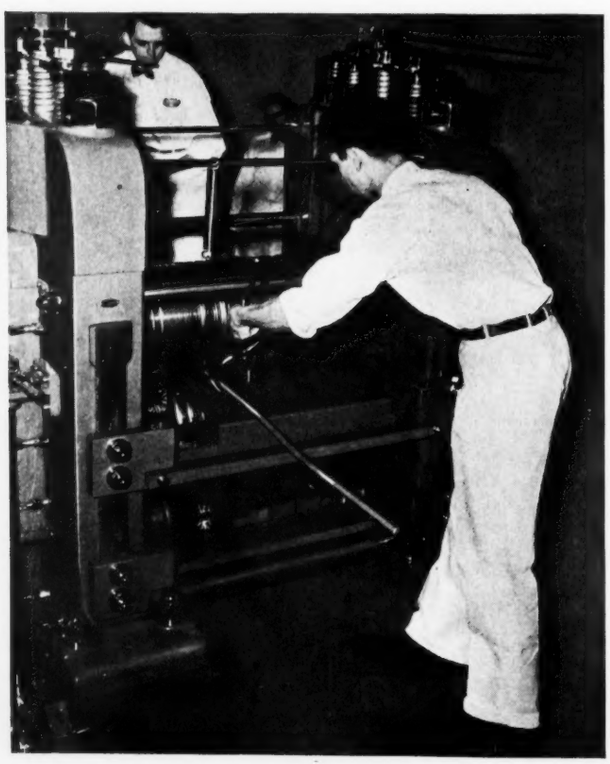
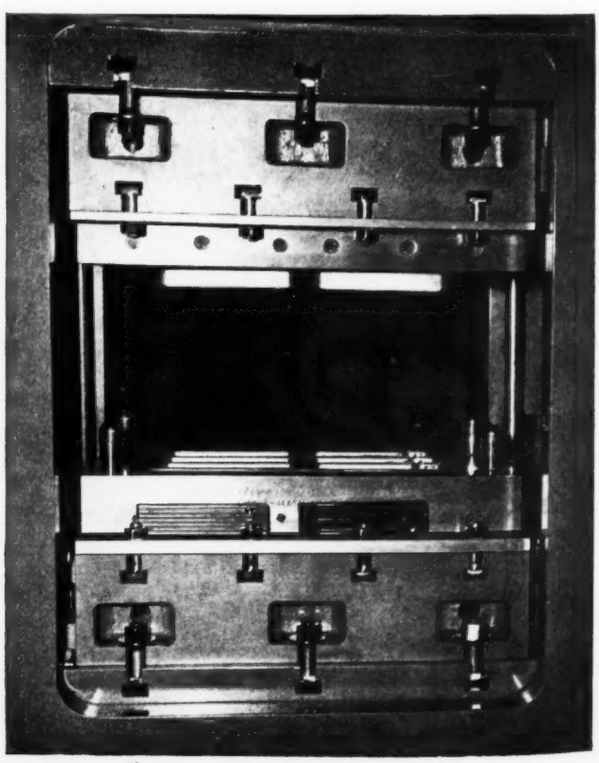
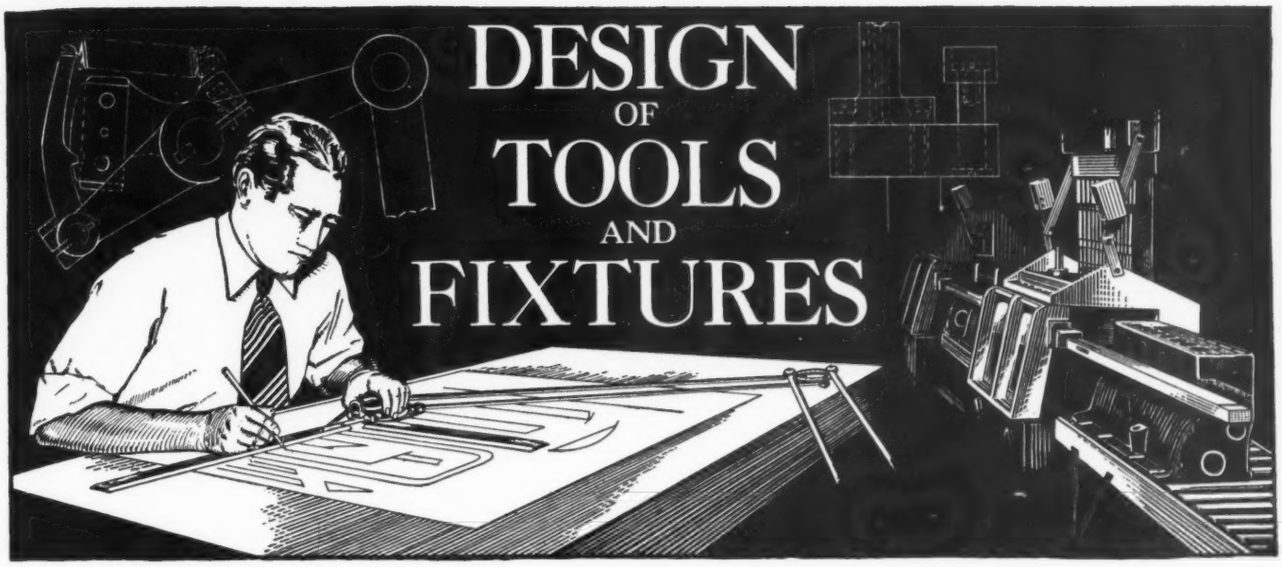


Fig. 14. Six-cavity Mold in a Hydraulic Press which Produces Accelerator Pedals from Soy Bean Pellets



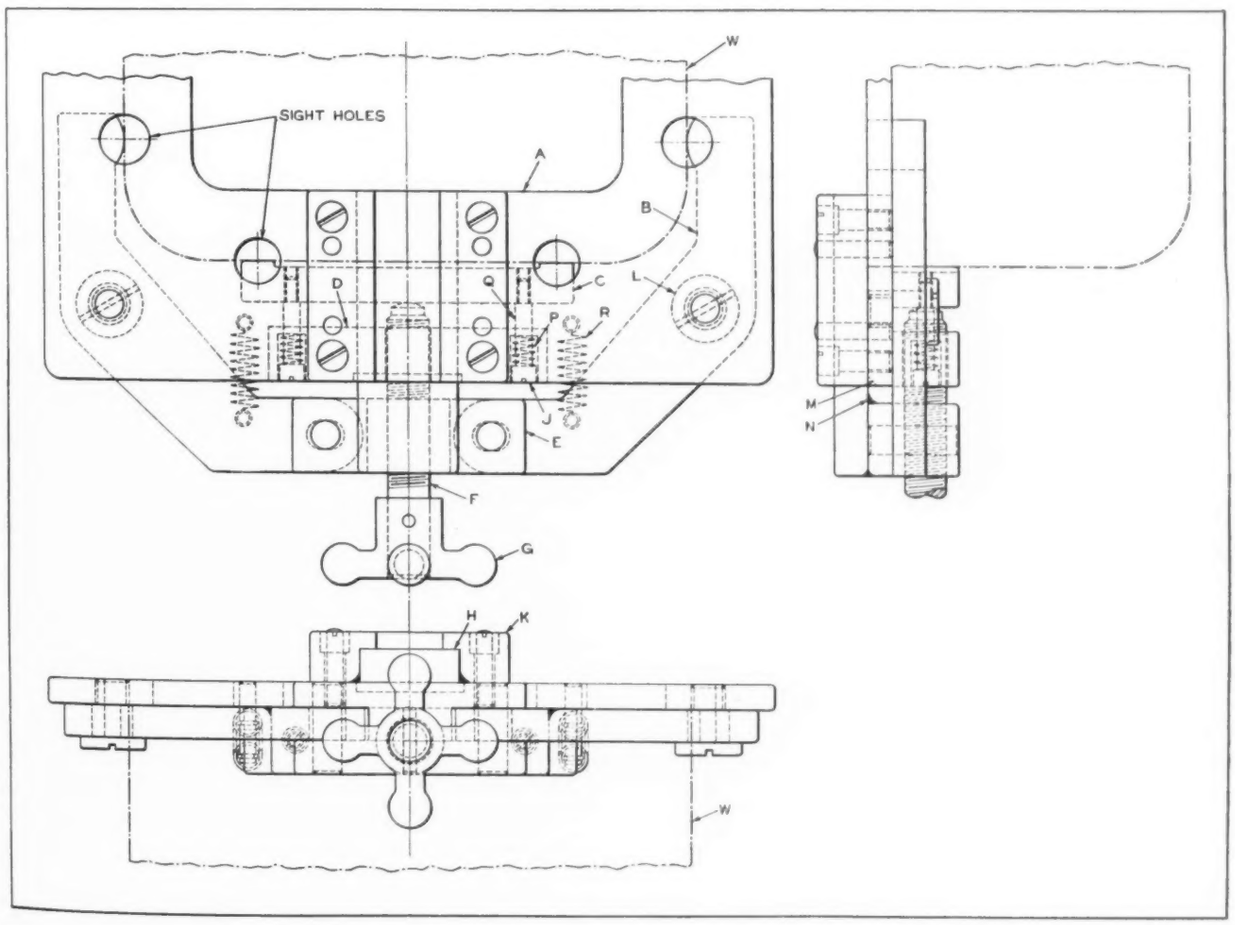


Toggle-Action Equalizing Clamp

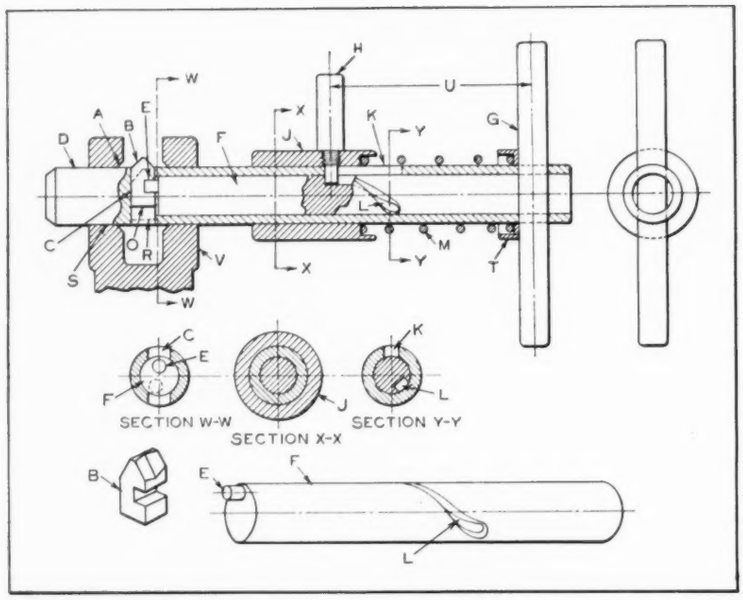
By H. B. FAUGHT, Burbank, Calif.

A toggle-action equalizing clamp that serves the double purpose of locating and clamping the work, both laterally and transversely, from one operating point is shown in the accompanying illustration. The work *W* for which this clamping arrangement was designed is a deep rectangular-shaped, gray-iron casting with a flat top and base. The two side-clamping members *B* and the end-clamping member *C* operate simultaneously.

The illustration shows the clamping arrangement



Toggle-action Equalizing Clamp Employed to Hold Drill Bushing Plate A on Casting W



Hand-operated Tool for Chamfering Edges A of Hole in Link V

as applied to one end of a drill plate *A*. The clamping arrangement at the opposite end of the plate is equalized in practically the same manner, except that a hardened stop-block, which corresponds to the clamping member *C*, is fastened to the drill plate by screws and dowels.

In operation, the drill plate is placed on the work *W*, as shown. Both hand-knobs *G* can then be turned simultaneously, if desired, until the locators, pivoting about fulcrum pins *L* meet resistance by coming into contact with both sides of the casting. This centralizes the work, and at the same time, causes the floating clamp block *C* to press the work into contact with the stationary stop. An additional turn of the hand-knob *G* then serves to force block *C* tightly against the work.

When hand-knob *G* is turned to release the work, clamp block *C* automatically travels back with the movement of screw *F* in the pivot block *E*, being actuated by two compression springs *P* which exert pressure against the heads of screws *J*. The two tension springs *R* are required to hold back pivot block *E* until the locators *B* reach their normal open positions. This arrangement is not required on the opposite end of the drill plate.

In using a clamping device of this type on work of thin cross-section where distortion might occur, a screw with a knurled handle might be used in preference to the hand-knob. The clamping arrangement, consisting of the two toggle arms or locators *B* and floating clamp block *C*, is retained by block *D*, which is welded to drill plate *A*. The slidable plate *H* which is welded to pivot block *E* is retained by the two guide blocks *K*.

The guide blocks are secured to drill plate *A* by dowels and screws. Locators *B* are retained in the notched ends of pivot block *E*, and are held to drill plate *A* by fulcrum pins *L*. Pivot block *E* is threaded to accommodate actuating screw *F*, while the retainer block *D* is provided with a hole that is large enough to clear the threads of screw *F*. The beveled edge of drill plate *A*, shown more clearly at *M*, is provided to clear the weld at *N*. To permit checking the operation of the clamp, drill plate *A* is provided with sight holes, four of which are shown in the illustration. For clarity, none of the drill bushings are shown in the drill plate *A*.

Hand-Operated Chamfering Tool

By PETER F. ROSSMAN, Kenmore, N. Y.

Chamfering the edges *A* of the link shown at *V* in the accompanying illustration presents a problem, in that the slot is too narrow to permit using chamfering tools of the type ordinarily employed. However, the chamfering of this part can be performed effectively and quickly by means of a hand-operated tool of the design here illustrated.

The tool bit *B* is fitted into a square slot in body *D*, and is operated by the eccentrically located pin *E* of the internal shaft *F*, which is retained in body *D* by the handle *G*. The releasing pin *H* is threaded to fit sleeve *J*, and passes through the slot *K* in body *D*, engaging the spiral slot *L* in shaft *F*. Spring *M*, by means of sleeve *J*, normally holds pin *H* in position on the center line. Pin *H* in slot *L* and the pin *E* serve to hold tool bit *B* in its proper position at *O*.

To insert the chamfering tool in the work, pin *H* is pulled back until its center is in alignment with the cross-section line *Y-Y*. This movement of pin *H* rotates shaft *F*, causing tool bit *B* to be retracted to the position shown by dotted lines at *R* within body *D*. Body *D*, which is a slip fit in hole *S* of the link, is then inserted in the work, after which pin *H* is released. Through the action of spring *M* and slot *L*, shaft *F* then causes tool bit *B* to move outward to the position indicated at *O*.

Body *D* is then rotated and moved axially by handle *G* against the edges to be chamfered. Withdrawal of the tool from the work merely requires pin *H* to be pulled back in the same manner as when the tool was inserted at the beginning of the operation. Tool bit *B* is designed so as to cut when rotated in either a clockwise or a counter-clockwise direction.

Sleeve *J* and spring retainer *T* are counterbored to receive spring *M*, so as to avoid possible injury to the operator's hand from contact with sharp edges on the spring ends. The distance *U* and the pressure of spring *M* are such that release pin *H* can be operated readily by extending one finger. The tool can be easily and quickly disassembled for sharpening or replacing bit *B* by merely unscrewing the releasing pin *H* and driving out handle *G*.

Dies for Blanking, Forming and Bending an Angular-Shaped Part

By JOHN J. McHENRY, Detroit, Mich.

Production of large quantities of the sheet-metal part shown at *W*, Fig. 1, presented an interesting manufacturing problem which was solved by the two dies shown in Figs. 1 and 2. The developed blank for part *W* is shown at *T*, Fig. 1. In the first operation, the strip stock is pierced by punch *C* of the die shown in Fig. 1.

Punch *C* forms a small projecting end *S*, view *T*. This end is bent up to a right angle, as shown at *U*, in a succeeding stage of the die by punch *E*, and the part is blanked in the final stage by punch *F*. This die has a solid type stripper *B* and a hardened tool-steel die member *A*. The punches are mounted in holder *D*. The punch *G* pierces the stock in the first stage, thus providing a locating hole for the pilot *H* in the second stage. A trigger cam at *J* withdraws the trigger *K* from the locating or stock indexing notch produced by punch *L* in the first stage.

In operation, the strip stock is fed between stripper *B* and die *A* while the press ram is at its top position. The stock is pressed against trigger *K*, which is moved back against the side *V* of its confining slot. The press is then tripped, and in this cycle, the strip stock is notched by the punch at *L*, while the pilot hole is pierced by punch *G* and the irregular-shaped hole is pierced by punch *C*. The cam *J* withdraws the trigger *K* just previous to the bottoming of the press ram stroke, and the coil tension spring pulls trigger *K* against the opposite side of the confining slot.

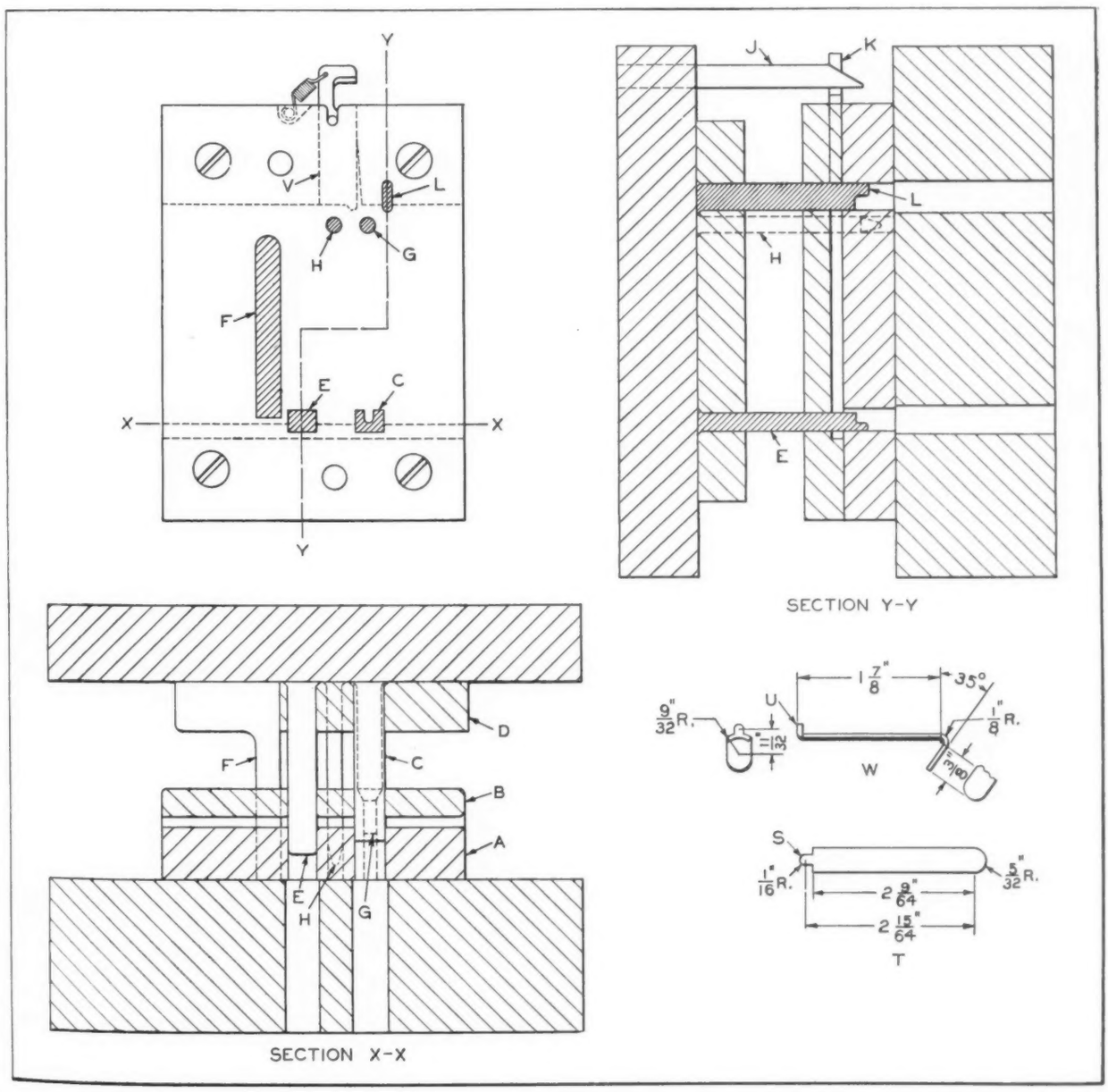


Fig. 1. Die that Performs Forming, Bending and Blanking Operations on Part Shown at W in Three Stages

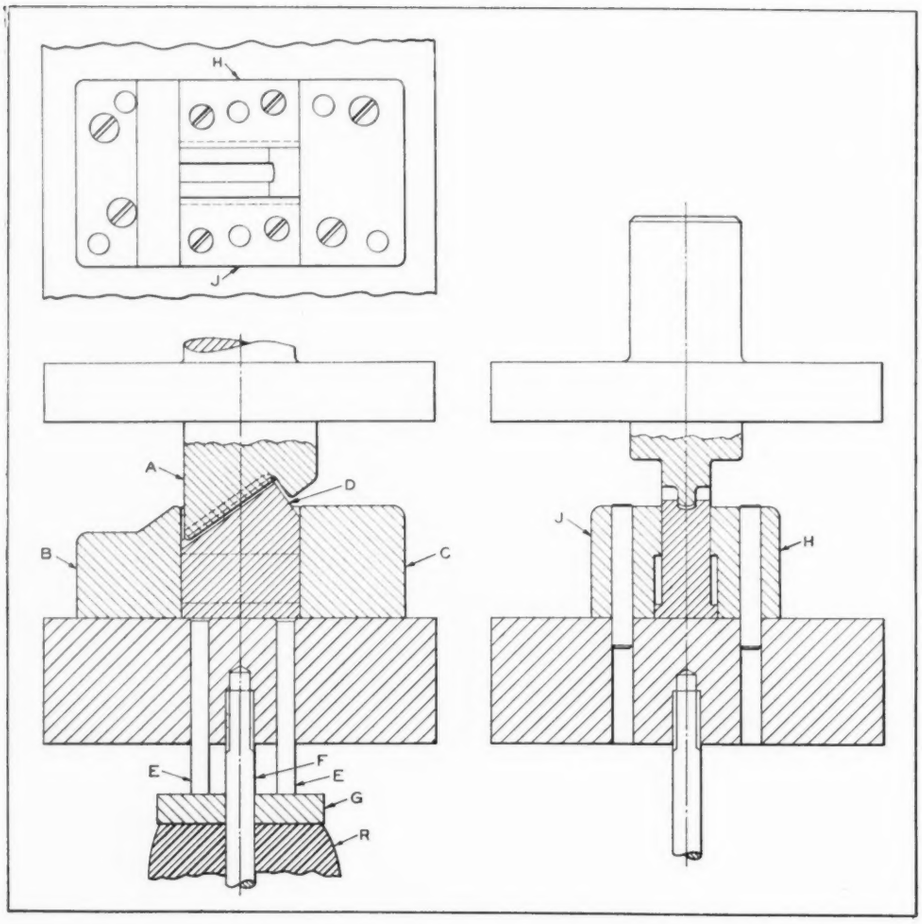


Fig. 2. Die for Final Bending and Forming Operations on Part W, Fig. 1

As the ram ascends, the trigger cam *J* is withdrawn and trigger *K* is returned by spring tension, so that it bears against the outer edge of the stock, thus permitting the stock to be advanced to the next station, where it is located by the trigger, which drops into the locating notch previously made by punch *L*.

The second operating cycle consists only of locating the strip by means of the pilot *H* which enters the hole pierced in the first stage or cycle by the punch *G*. In the third stage, the die, in addition to performing the operations previously described, produces the right-angle bend in the short projecting end previously formed by punch *C*, the bending operation being performed by punch *E*. This punch is backed up by a heel during the bending process and is also utilized as a pilot to assist pilot *H* in locating the strip stock.

The fourth cycle, in addition to the operations already described, blanks out the part, freeing it from the strip stock, the blanking being done by punch *F*. A blank with a short right-angle bend is then produced at each succeeding cycle of the press ram. The press can be run continuously—that is, without stopping between cycles. The operator simply keeps advancing the strip stock, which is stopped and located automatically through the action of trigger *K* and pilots *H* and *E*.

The blank formed in this die is now ready for the second operation, which consists of the semicircular forming of the body and the bending of one end to an angle of 35 degrees. This operation is performed in the die shown in Fig. 2, which is composed of forming punch *A*, bending block *B*, retaining block *C*, forming die *D*, pressure pins *E*, stem *F*, washer *G*, rubber bumper *R*, and retaining blocks *H* and *J*. With the press ram at the top of the stroke, forming die *D* is held in its uppermost position through the pressure exerted by the rubber bumper *R* against washer *G* and pressure pins *E*. With the die in this position, a semi-formed blank is placed in the slot in forming block *D*, the short right-angle bend in the work being placed in contact with the plain face of forming block *D*. The press is then tripped.

On the down stroke, the forming punch *A* locates the work through the action of the punch heel which forces the short right-angle bend firmly against forming die *D*. Compression of the rubber bumper serves to begin the semicircular forming operation on the work. On the downward stroke the part is bent to an angle of 35 degrees. At the bottom of the stroke, the semicircular bend is "set" by the punch, thus completing the part.

* * *

Oakite Products Celebrates Thirtieth Anniversary

Oakite Products, Inc., 22 Thames St., New York City, has just completed thirty years of service in the industrial cleaning field, a period that has been marked by a most rapid growth. More than one hundred Oakite service representatives are now available in every industrial center and large city throughout the United States. The warehouse stocks that are maintained at these centers make possible store door deliveries of Oakite materials and cleaning compounds in over 4800 towns and cities. In commemoration of the thirtieth anniversary, the company has published a book illustrating and briefly describing the different types of service that the concern renders in practically every industrial field.

Questions and Answers

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

Perforating and Blanking Dies

H. R. H.—The article by M. J. Goldstein, entitled "Perforating and Blanking Dies for Small Ornamental Parts," on page 247 of the December, 1938, number of MACHINERY prompts a number of questions: (1) What advantages are there to be gained by using a particular brand of steel? (2) Could the author outline the method of heat-treatment that was used for the die? (3) Was the drill rod of alloy steel or ordinary carbon steel? (4) Is it advisable to stagger the length of punches or allow them all to enter the die at the same time? (5) What was the time required to produce the first complete die? (6) If it had been possible to anticipate the large production per grind, would it not have been advisable to use punches 1/2 inch shorter? The shorter punches would be sturdier and would still have life enough to produce in great quantities.

Answered by M. J. Goldstein

1. While the brand of steel used may not seem of great importance, I consider it a prime requisite in successful diemaking. The brand used is known not only for its non-deforming qualities, but also for the absence of "skin softness" after hardening. In the case of this particular die, it would obviously be impossible to grind or lap the openings to remove 0.003 to 0.005 inch, in order to eliminate a soft surface or skin. This would lead to a more rapid wear and bell-mouthing of the openings in the die.

2. Referring to the heat-treatment of the die, a Leeds & Northrup electric furnace was used. While normalizing is not ordinarily required in the heat-treatment of oil-hardening steels, in this instance the die was brought up to 1400 degrees F., the recording pyrometer having shown that temperature to be the critical point for the steel used. After cooling, the heat was brought up to 1475 degrees F., and the die was then quenched in a No. 2 Texaco quenching oil. At this point, the die was tested and showed a hardness of C 65 Rockwell. The die was then drawn to 450 degrees F. and showed a hardness of C 60 Rockwell.

3. The piercing punches were made of carbon drill rod and hardened in kerosene; I consider this quenching medium the best for this particular purpose, since there is less deflection due to hardening strains. The punches were drawn to 500 degrees F. and showed a hardness of C 58 Rockwell; each change of 25 degrees equals one point on the Rockwell C scale.

4. The punches, after being assembled in the punch plate, were ground with a shear so that those located at the ends of the blank were approximately 1/32 inch shorter than those at the center.

5. My records show the actual working time on this die to have been 365 hours. This included making templets, hardening time, and time required for making general and special tools used in the broaching operations, whereby the holes were accurately transferred from the die through the stripper and punch-plates.

6. I do not think the length of the punches excessive, as this punch-plate and stripper are each 3/8 inch thick and the front and back gages for the stock 1/8 inch thick, leaving 5/8 inch for the operating length. The die had produced over 100,000 pieces at the time the article was written; it has, up to April 10, produced 1,370,000 pieces. The die and punches have been ground ten times, removing approximately 0.003 inch per grind, and are in a fine condition to produce the 5,000,000 pieces that we estimate we will require for this year's production, not only for the candy dish that was shown in the article, but for about 100 other items.

Liability for Machinery Damaged in Transit

K. A. E.—Are a private carrier and a common carrier liable to the same extent for damage to, or loss of, machinery being transported?

Answered by Leo T. Parker, Attorney-at-Law
Cincinnati, Ohio

A private carrier is not liable for loss of, or damage to, shipped goods unless the testimony indicates that he failed to use ordinary care, whereas a common carrier is practically an insurer of the safe arrival of goods.

* * *

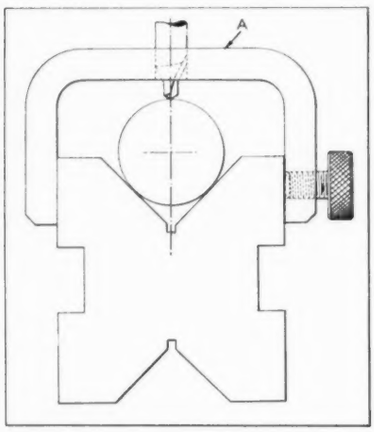
The maker of a manufactured product sets the price, of course, but he is not really the man who determines what the price is to be; that is actually determined by the customer. If the price set by the manufacturer is higher than the customer will pay, then the manufacturer will not be able to sell at the price that he has set, and will be forced to reduce his price to that considered satisfactory by the customer.

Ideas for the Shop and Drafting-Room

Time- and Labor-Saving Devices and Methods that Have been Found Useful by Men Engaged in Machine Design and Shop Work

Center-Drilling Attachment for V-Block

After a shaft has been placed in V-blocks and secured by the usual hook type clamp, an accurate center hole for cross-drilling can be made by using a centering bar or jig on one of the blocks, as shown at *A* in the accompanying illustration. The centering bar guides the center drill, which is used to make a sufficient impression for locating and guiding the drill. The centering bar could be made wide enough to carry a row of plain or bushed holes of different sizes for guiding standard drills.



V-block with Center-drilling Attachment

F. H.

A Differential Turnbuckle for Fine Adjustment

The accompanying illustration shows a turnbuckle link connecting the two levers *A* and *B* on a machine where a fine adjustment within a short range is required. The standard turnbuckle having right- and left-hand threads, 5/16 inch in diameter with twenty-four threads per inch, first employed gave an adjustment of 0.083 inch per revolution of rod *C*, which was too coarse. By using a thread of the same hand on both ends of rod *C* and in the yokes *D* and *E*, with twenty-four and eighteen threads per inch (or having a pitch of 0.0417 inch and 0.0556 inch respectively), we obtain an adjustment of 0.0139 inch per revolution of rod *C*. Owing to the differential action, the adjustment became approximately six times finer than that of the conventional turnbuckle.

Kenmore, N. Y. P. F. ROSSMANN

Simple Method of Locating Parts in the Stock-Room

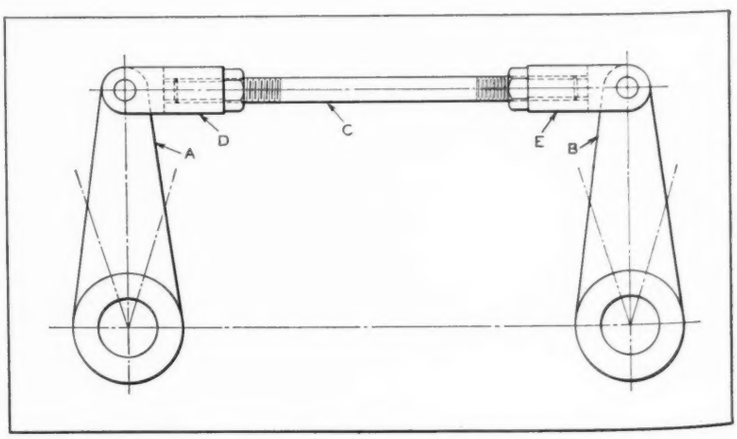
A simple method is employed in the stock-room of a large machinery company making a number of standard machines, to enable parts to be easily located. It consists merely of painting the edges of the metal uprights supporting the shelves in different colors to denote the various machines. For example, the uprights supporting the shelves on which the parts for one machine are kept are painted blue, another set of uprights orange, another red, etc. With this system, the stock clerk immediately knows where to find the part of a certain machine. The parts themselves are indexed on the edges of the shelves.

Hudson, N. H. ROGER C. DICKEY

Removing Bushings with Hydraulic Pressure

The article entitled "Device for Pulling Bushings from Blind Holes" on page 268, December, 1938, MACHINERY, brings to the writer's mind a method that will remove bushings from blind holes even when there is little or no clearance between the bushings and the bottom of the holes. The procedure is as follows: The bushing hole is filled with oil, approximately three-fourths full; a round piece of steel 4 to 5 inches long and a close fit in the hole is inserted; and then the steel rod is struck a sharp blow with a hammer. The oil will be forced underneath the bushing and will press it upwards, making for easy removal.

Fond du Lac, Wis. J. A. YUNGWIRTH



Turnbuckle with Both Threads of the Same Hand but of Different Pitch for Fine Adjustment

Comparison of Processes for Forming Metals

By W. L. RENZ, Manufacturing Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

A Brief Review of the Various Means Used for Producing Metal Parts of the Required Shape and Finish

TODAY, we form metals by sand casting, permanent molding, die-casting, hot-pressing, forging, and fabricating by pressing, riveting, or welding, with or without subsequent machining. In order to apply any method economically, we should consider the relationship of the ultimate unit cost of the different processes as affected by tool cost, tool maintenance cost, and cost of machining the part to make it applicable for assembly. The design and materials have much to do with the method chosen for forming metals. When close tolerances are essential, tool and tool maintenance costs generally increase, and the unit cost of the product is raised in proportion to the refinement required.

On mass production, the tooling is usually carried to the highest degree of perfection, in order that the piece cost may be kept low, whereas on low production, the making of tools is sometimes prohibitive and piece costs are generally high.

Sand Casting—An Early and Well-Known Process

In this connection, we need not dwell on the sand casting method and the materials that can be formed by this method, because they are generally known, but rather pass on to design and manufacturing questions. Comparatively speaking, sand castings, due to present foundry equipment, have a low tool or pattern cost. The patterns, as a rule, are not perishable, and consequently the tool maintenance is low. The cost of sand casting is high, compared with die-casting, as it is necessary to prepare a mold for each casting or group of castings. The tolerances are governed by the accuracy of the mold, but are not so close as can be obtained by other methods; therefore, machining of sand castings is necessary in cases where accuracy must be maintained.

This method can be used economically for both small and large production, depending on the requirements. There are, however, designs that cannot be formed by any other method than by sand casting without expending much labor in finishing the part. In cases where the design is such as to permit wide tolerances of, say, 1/32 inch or more on small castings, and the material, as cast, is strong enough for the job, sand casting is the least expensive of any of the methods mentioned, owing to the fact that both the material cost and the tool maintenance cost are lower.

Permanent molding is used on only a few of the metals and metal alloys. Not all metals are suitable for forming by this method. The molds are expensive, as each mold must be gated and vented for the particular casting, since the metal is sluggish in this type of mold and is subject to air trapping. Maintenance costs are high, because of the high pouring temperatures (approximately 2200 degrees F.) which causes wear of the die and makes it difficult to maintain the tolerances. As tolerances can be controlled better in permanent molding than in sand casting, many machine operations can be eliminated. This method is not so flexible as sand casting in that only straight cores are possible. Metals generally formed by permanent molding are iron, aluminum, and iron-aluminum bronze.

Many castings, when made in sand, require considerable machining, but by using a permanent mold, machining can be practically eliminated. Parts can be cast to size within close tolerances. Contact surfaces are smooth enough not to require finishing. However, if the cores are more than 1 inch deep, it may be necessary to broach or ream the holes to obtain the desired tolerances. No holes less than 5/16 inch in diameter should be cast in permanent molding, as it is less expensive to drill such holes. Small holes of odd shapes can be cast, but will probably require a finishing operation. This method of forming metals is used mostly on medium-production jobs with close tolerances and finish requirements, where the production does not warrant the expense of a mold for die-casting.

When Die-Casting Best Suits the Requirements

Die-casting is generally the most expensive method of forming metals from the standpoint of tool cost, but unit cost may be very low if production is high. The advantages to be gained are close tolerances and little, if any, machine work. Metals that can be die-cast are zinc, magnesium, aluminum, brass, and iron-aluminum bronze. As in permanent molding, only straight cores can generally be used. Tool maintenance is high on the metals and alloys having high melting points, but low on zinc and zinc alloys. The cost of molding is usually the lowest of any of the methods described, especially in straight molding. While cores or inserts can be molded into the casting, they tend to slow up the casting operations, thereby increasing production costs.

Usually this method is applicable to high-production work, but there are exceptions where medium- or low-production parts can be economically made by die-casting, if very expensive machining operations can be eliminated. Many parts of automobiles, office equipment, and household appliances are being successfully made by this method at very low cost, and with little or no cost for finishing and machining, as the surfaces are smooth and close tolerances can be maintained. Closer tolerances can be met with the zinc and zinc alloys than with metals of higher melting point. As a general rule, if very close tolerances are required on a piece made of iron-aluminum bronze, it is necessary to size or shave the part after the die-casting operation, in order to meet the requirements.

The Hot-Pressing Process

Hot-pressing is successfully used in connection with brass and copper. There is a definite flow of the metal when using this process. The tool cost is high, because of the rigidity and resistance to abrasion required in the tools to withstand the pressures. The piece price is low, and many machining operations can be eliminated. The flash affects the accuracy of the part, but this may be overcome in some cases by a sizing or shaving operation. However, this means additional tool cost and piece cost. The abrasive action is high, as the metal is usually forced to flow in all directions. It is worth noting, however, that the abrasive action is far more severe in forming copper than brass. As copper does not flow very readily, it requires a quick stroke of the press to force the copper a great distance without scoring the die. If brass can be used instead of copper, the upkeep of the die will be much less, as brass flows readily and does not score the die. This method should be used when strength and conductivity are required in the part. The material price is higher for pressing and forging, but the labor cost of forming is lower than for sand casting or permanent molding.

Comparative Advantages of Different Processes with Reference to Some Factors of Manufacturing Costs

In each case, Method No. 1 represents the lowest cost, the other methods increasing in cost in the order numbered.

Factors of Manufacturing Cost	Methods of Forming
Initial Tool Cost	1. Sand Casting 2. Fabricating 3. Forging 4. Hot Pressing (brass) 5. Hot Pressing (copper) 6. Die-Casting (zinc) 7. Permanent Molding 8. Die-Casting (aluminum)
Tool Maintenance Cost	1. Sand Casting 2. Fabricating 3. Hot Pressing (brass) 4. Forging 5. Die-Casting (zinc) 6. Hot Pressing (copper) 7. Permanent Molding 8. Die-Casting (aluminum)
Piece Cost, as Produced by Die, Mold, or Tool	1. Die-Casting (zinc) 2. Die-Casting (aluminum) 3. Hot Pressing (brass) 4. Hot Pressing (copper) 5. Forging 6. Permanent Molding 7. Sand Casting
Cost of Machining Part Made from Die, Mold, or Bar Stock	1. Die-Casting (zinc) 2. Die-Casting (aluminum) 3. Hot Pressing (brass) 4. Hot Pressing (copper) 5. Permanent Molding 6. Forging 7. Sand Casting 8. Fabricated from Bar Stock

The Application of Forging

As a rule, when we speak of forgings, we refer to those made from low-carbon steels and from the different grades of alloy steels containing nickel and chromium; but there are instances when the forging process can be used for copper and copper alloys. Forgings usually can be made with a medium tool cost and medium piece cost, as compared with parts produced by die and sand casting. The machining cost is high, but sizing operations (as part of the forging process) are sometimes added, which tends to decrease machining costs. The advantage of forging lies in the grain structure of the metal, which gives greater strength to the metal. Hot forgings have greater strength than cold-worked materials. In late years, cold-forging has become a general practice in producing small parts. In many cases, when strength is required, it is possible to use a better grade of material and heat-treat it.

The Fabrication of Materials

The details of the fabrication of materials by pressing, riveting, welding, and machining do not come within the scope of this article, since many more considerations must be given attention than could be covered in a brief review. Generally, for machining operations, the cost of cutting tools and tool maintenance costs are usually low on standard machine tools. Machining costs depend upon many factors, including the quantities required. The fabrication of parts on a quantity basis with automatic and semi-automatic equipment is a subject by itself, and will not be considered here.

Engineering Design Problems Affecting the Choice of Forming Method

The engineering design problems to be considered cover physical properties—strength and wearing qualities. The choice of metal suitable for the product depends upon the tensile strength, yield point, elongation, coefficiency of expansion, hardness, corrosion, aging qualities, etc., of the metal.

Having decided upon the material that has the desired strength and wearing qualities, the most practical method of forming the material should be

considered. The kind of material necessary will, as a matter of course, eliminate some of the methods mentioned, and therefore simplify the designer's tool problems; but before designing, a careful study should be made of the production requirements and life of the design. This cannot be emphasized too much, as it has a great deal to do with the production of parts economically. The design should be as simple as possible, in order to keep costs low.

For the more expensive metals, such as bronze and aluminum, it might be well to consider permanent molding, if the production is fair and much machining is necessary. Here, again, we have the problem of coring, as metal cores are generally used. If the production is very high, die-casting might be considered, when the material can be cast by this method. Any of these methods should be thoroughly analyzed from the cost standpoint, and probably several designs for different methods will be sent out for comparative bids before completing the design.

As to forging and hot-pressing, it is often difficult to know where to draw the line. We naturally think of iron and steel as materials for forging; if the production warrants, dies can be made to size the forging to close tolerances, thereby eliminating expensive machining operations.

In conclusion, the most economical design is one made to suit the method of manufacture. Any change in the demand for a part that would warrant a change in manufacturing methods should also entail consideration of a change in design to suit the method of manufacture. It cannot be expected that a part designed to be produced by sand casting can be made economically in a permanent mold or by die-casting.

The accompanying table shows the approximate order of the different methods of forming metals in respect to initial tool cost, tool maintenance cost, piece cost, and relative cost of machining parts. This table represents only a broad aspect, and may require modifications, but in the main, it will give accurate guidance.

* * *

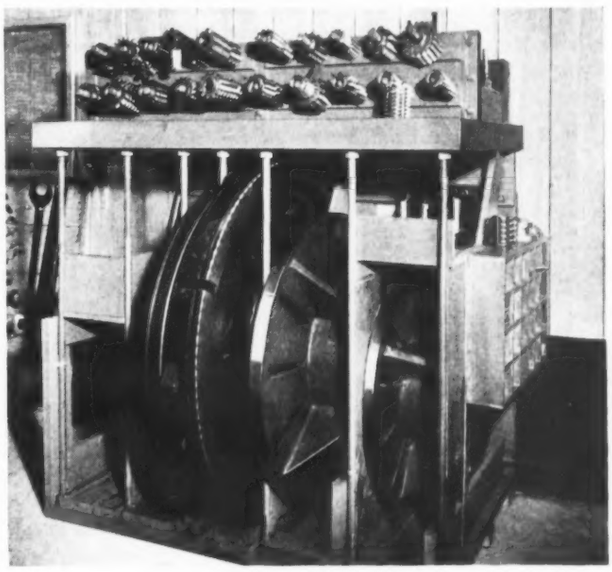
Internal-Combustion Engine Industry Seventy-Five Years Old

The internal-combustion engine industry this year may well commemorate the seventy-fifth anniversary of the founding of that industry. It is seventy-five years since the well-known constructor of the Otto engine, Nikolaus August Otto, started a plant for building Otto gas engines in Deutz, a suburb of Cologne, now known as Köln-Deutz. Since that time, the plant has grown to large proportions, but the old section of the shop where Otto built his first gas engine is still preserved as a department of the present plant. Today, the firm, known as the Humboldt-Deutz Motoren, employs, in all, some 18,000 people, of these about 6000 in the plant built around the original Otto shop.

Storing Hobs and Gear-Cutting Machine Tables to Guard Against Damage

The illustration shows one of several racks designed by the gear-cutting department of the Watertown Arsenal to guard against damage to the hobs, arbors, and tables of the gear-cutting machines when they are not in use. Past experience proved that tables sprang as much as four or five thousandths inch when merely laid on the floor for a time, with resulting difficulties in the cutting of accurate gears.

By placing the tables in racks of the type shown, their continued accuracy is insured. All of the cutters and arbors are supported on wooden pegs and rest against wooden boards. Wrenches



Rack Designed for Storing Hobs and Gear-cutting Machine Tables

for the various machines are also mounted on boards and must be replaced immediately after use, a rule that enables a wrench to be easily found when required.

* * *

The attitude of the American people at this moment is one of recoil from those very constituents of greatness which vigorous peoples have hitherto everywhere and always struggled to obtain. The American people have let themselves be persuaded that in every phase of their activity they are threatened by the expansion of their power and must contract it; that they must withdraw, retreat, fence in, batten down, plow under, work less, save less, invent less, invest less, and risk nothing. For the moment, the American people are acting on the assumption, though in their hearts they reject it, that their incomparable assets are their most dangerous liabilities.—*Extract from an article by Walter Lippman, entitled "The American Destiny," published in "Life."*

Honing in the Aircraft Industry

By KIRKE W. CONNOR, President
The Micromatic Hone Corporation, Detroit, Mich.

THE honing of cylinder barrels and master connecting-rods for radial air-cooled aircraft engines was dealt with in the first installment of this article, which was published in July MACHINERY, page 776. The present installment will describe the honing of a variety of other parts for aircraft engines.

Knuckle-pin bores of master connecting-rods are being honed with the equipment shown in Fig. 4, which includes rear-piloted honing tools and an indexing fixture. Finish-honing of two bores is performed in tandem in two operations. In the first operation, approximately 0.0005 inch of stock on the diameter is removed from a ground finish. The eight sets of holes are honed in a total of 33 minutes floor-to-floor time. All of the holes are then chromium-plated to a plating thickness of 0.0003 inch on a side. The chromium-plated holes are next honed in an allowed time of 40 minutes within an accuracy of 0.0002 inch for roundness and straightness. Plating and honing of these holes eliminates galling in the frequent assembly and disassembly of knuckle pins in service. The first honing operation insures a uniform plating thickness. The fixture is released for indexing by depressing a foot-pedal.

The six arm bores of the propeller shaft seen in Fig. 5 are honed with the equipment illustrated. These bores are each 1 3/4 inches in diameter by 2.240 inches long, and are honed in a single operation following precision boring. Approximately 0.0012 inch of stock on the diameter is removed in a floor-to-floor time of 19 minutes for each propeller shaft. Straightness and roundness of all bores is held within 0.0002 to 0.0003 inch. The holes are honed to facilitate assembly, an applica-

Fig. 4. The Knuckle-pin Bores of Master Connecting-rods are Honed before and after Chromium-plating

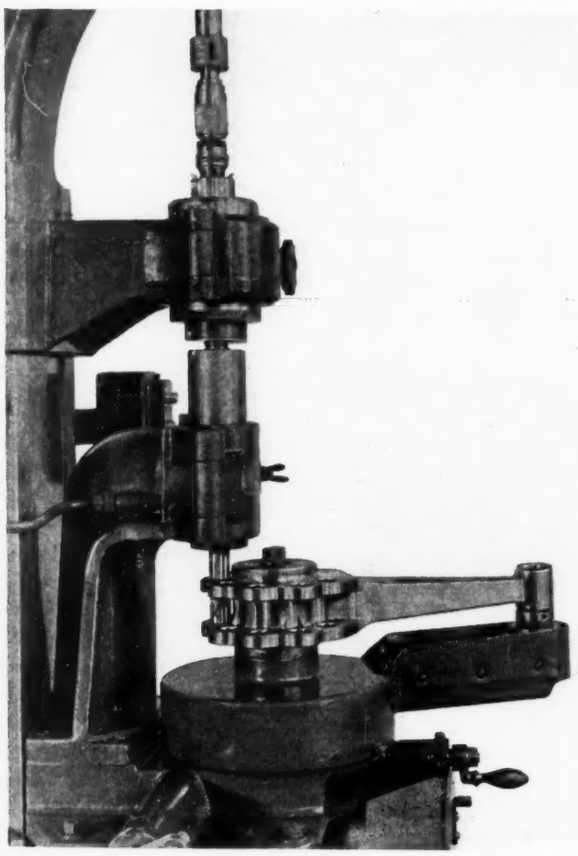
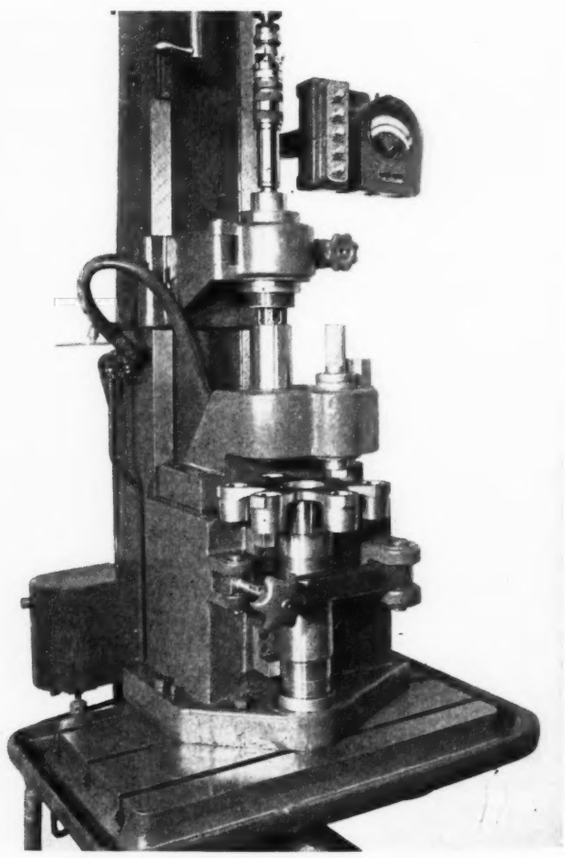


Fig. 5. Six Arm Bores of This Propeller Shaft are Honed Straight and Round within Limits of 0.0003 Inch



tion of the honing process that demonstrates the economic advantage of honing after precision operations. Hand-operated plugs are used to locate the different bores in the correct axial alignment with a hone guiding bushing that is built into the fixture.

Two bores 2.230 inches in diameter by 2 inches long in the crankshaft harmonic balancer, shown in Fig. 6, are finish-honed in two operations. From 0.001 to 0.0015 inch of stock on the diameter is removed, the holes being finished within 0.0002 inch as to roundness and straightness. The allowed honing time is 3 minutes per hole, production averaging from eight to ten harmonic balancers per hour. These holes were formerly machine-lapped at the rate of only two balancers hourly.

The crankpin hole of the crankshaft illustrated in Fig. 7 is honed with a rear-piloted type of tool following a reaming operation. From 0.001 to 0.0015 inch of stock on the diameter is removed from a surface 2 inches in diameter by 1 1/2 inches in length. This operation is performed in 5 minutes within an accuracy of 0.0002 inch for roundness and straightness. The steel forging has a hardness of between 290 and 320 Brinell. The hole is honed to minimize fatigue cracks which might occur when the bore is threaded and to permit a positive oil seal with pressed-fit plugs.

Airplane-engine valve tappet guides, similar to those shown in Fig. 8, are honed in an operation in which 0.001 inch of stock on the diameter is removed from a ground finish. The accuracy of the bore is held within 0.0002 inch for roundness and straightness. In this application, it was found that the honing tool sprung the split section of the bore slightly, and that following the honing operations this section tended to revert to the original diameter, which was an advantage in assembling.

Honing Aircraft-Engine Parts to Obtain Closest Possible Fit

In certain aircraft-engine assemblies, it is desirable to obtain the closest possible fit of wearing parts, both to eliminate wear and to obtain an oil seal. This is true of a steel bushing that is assembled into the supercharger rear housing shown in Fig. 9 and the part that engages this bushing. The bushing is 2 3/16 inches in diameter by 1 1/4 inches long, and has a hardness of between Rockwell C 36 and C 40. The bushing is ground in a preliminary operation and then finish-honed with a rear-piloted honing tool in one operation. Approximately 0.0005 inch of stock on the diameter is removed in a floor-to-floor time of 5 minutes, the

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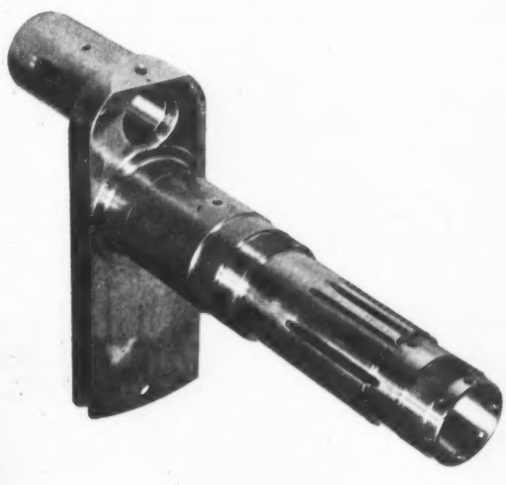

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Figs. 6 to 8. Crankshaft Harmonic Balancer, Crankshaft, and Valve Tappet Guides, which are Honed to Obtain the High Degree of Accuracy Demanded by the Aircraft Industry

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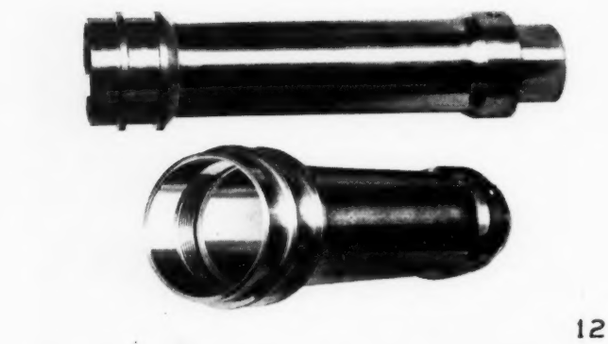

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accuracy as regards roundness and straightness being within 0.0002 inch.

Honing has also been adopted as a final processing on hydraulic brake-control units. The brake torque spider shown in Fig. 10 has a blind-end bore in which there is a steel bushing. This bushing is finish-honed in one operation following grinding. From 0.001 to 0.0015 inch of stock on the diameter is removed within an accuracy of 0.0002 inch as regards roundness and straightness.

Honing Used for Obtaining a High Finish in Landing-Gear Cylinders

Honing is also widely employed for the final processing of landing-gear shock-absorber parts. In Fig. 11, is shown a group of landing-gear cylinders, all of which are made of chromium-molybdenum steel of approximately the same analysis as S A E X-4130. The bores of the lower four cylinders seen in the illustration range from 1 7/8 to 2 9/16 inches in diameter and their length from 6 5/8 to 16 inches. These cylinders were formerly bored, reamed or ground, and polished. They are now honed in two operations following a rough-boring, from 0.010 to 0.015 inch of stock on the diameter being removed by honing. An accuracy of 0.0005 inch is obtained on the diameter and the final finish is between 1.5 and 2 micro-inches.

The long cylinder seen at the top in Fig. 11 has a nominal internal diameter of 3 1/16 inches and a length of 19 1/4 inches. This cylinder is honed in two operations following grinding, from 0.006 to 0.0065 inch of stock on the diameter being removed in a rough-honing operation and about 0.0007 inch of stock on the diameter in a finish-honing operation. Honing results in an accuracy of 0.0001 inch with respect to roundness and 0.0002 inch with regard to taper. The actual time for the two honing operations is 7 minutes. In Fig. 13 is shown a general view of two machines used for honing landing-gear cylinders.

A combination boring and honing machine for processing landing-gear cylinders is illustrated in Fig. 14. Some of the tubes machined have an internal shoulder that creates opposed blind-end bores. The machine is designed for using either push or pull type boring tools as may be required by the construction of the cylinders. Boring feeds ranging from 0.062 inch to 12 inches per minute and a rapid traverse of 30 feet a minute are provided.

Reciprocatory speeds of from 35 to 60 feet a minute are available for honing. There is a positive hydraulically actuated control for stopping the head in the same position at each end of the stroke

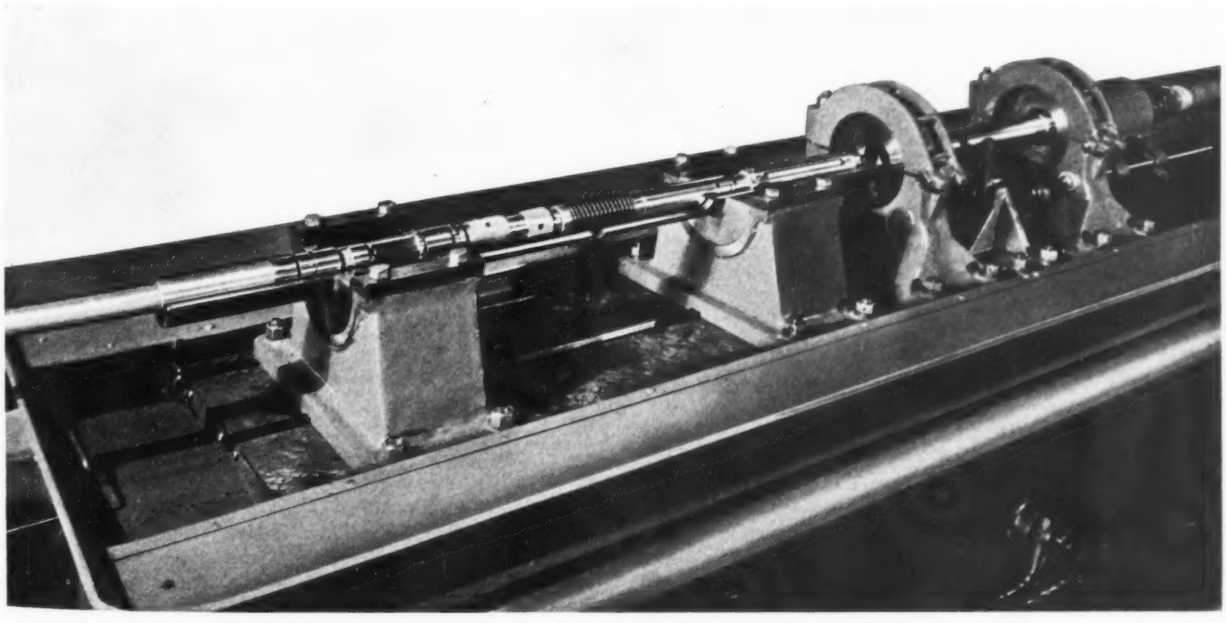
Figs. 9 to 12. Other Examples of Airplane Parts on which Honing Operations are Performed

Fig. 13. Honing Machines Employed for the Final Finishing of the Bore in Landing-gear Cylinders

within a tolerance of 0.002 inch. An adjustable dwell control for convenience in honing blind-end or shouldered work is also provided. Spindle speeds ranging from 66 to 600 R.P.M. are obtainable through change-gears in the head.

One of the most recent honing applications has been the finishing of a blind-end cylinder of the type seen in Fig. 12 which is used in a wing-flap actuating mechanism. This part, which is made from S A E 4340 steel, is finished in two honing operations following grinding, during which from 0.003 to 0.004 inch of stock on the diameter is removed in 5 to 6 minutes of rough-honing, and from 0.0004 to 0.0007 inch of stock in a finish-honing operation of 30 seconds. This part operates in a hydraulically actuated assembly and is fitted with a synthetic rubber piston. Maximum accuracy and smoothness are essential, as the assembly must pass an inspection that involves the application of a hydraulic pressure of 2500 pounds.

Fig. 14. Machine Devised for Performing Both Boring and Honing Operations on Landing-gear Cylinders

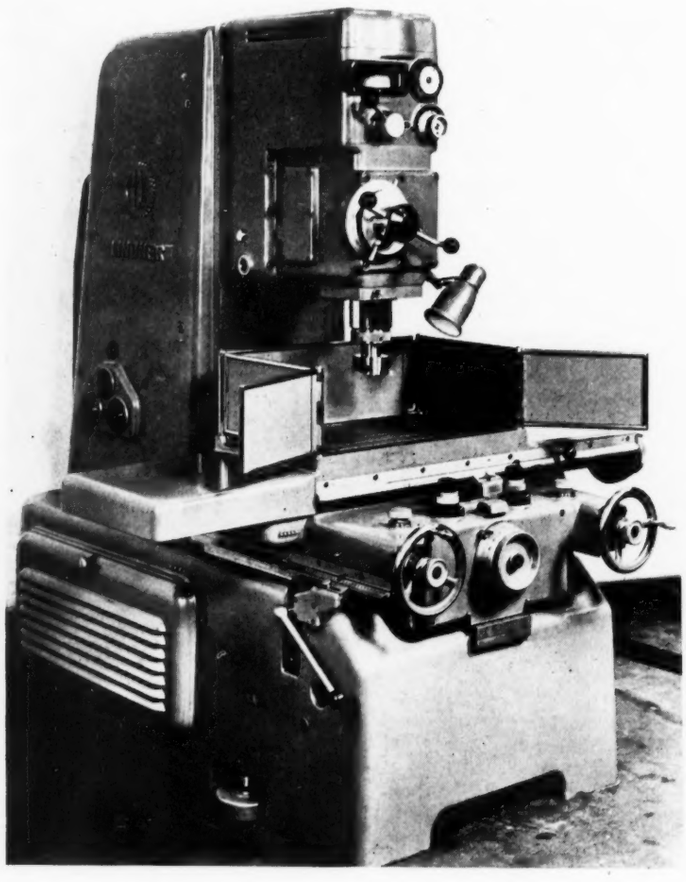


Trends in Machine Tool Design as Noted at the Recent Leipzig Fair—3

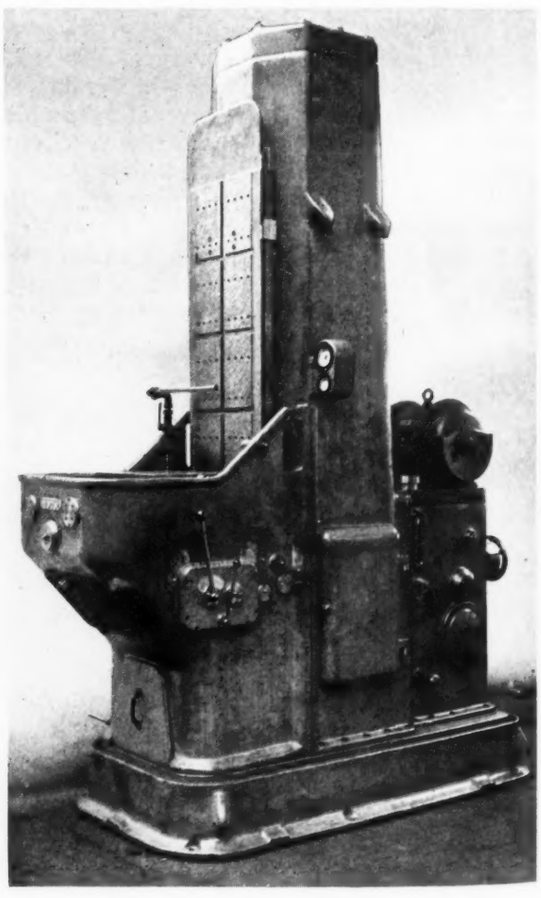
IN May and June MACHINERY, pages 650 and 710, respectively, some of the machine tools exhibited at the recent Leipzig Fair were illustrated, in order to show the trend of present German machine tool design. The present article gives further examples of representative types of German machine tools and deals briefly with some of the more unusual developments observed. This brief review is a continuation of that published in the June number.

The fact that certain raw materials are scarce in Germany has had a definite influence on machine tool design. The beds and frames of many machines are welded rather than cast, not only for the sake of convenience, but to save weight and materials as well. The design of welded beds and frames has been carefully carried out, and the appearance, in most instances, is unusually attractive. While welded construction for presses, shears, and similar machines is common practice everywhere, the use of welding for the beds of grinding machines, as well as other parts formerly made from cast iron, is somewhat of a novelty. It is claimed that the use of thin welded steel plates, properly ribbed, provides a bed of the same rigidity as a cast-iron bed, but of only half the weight.

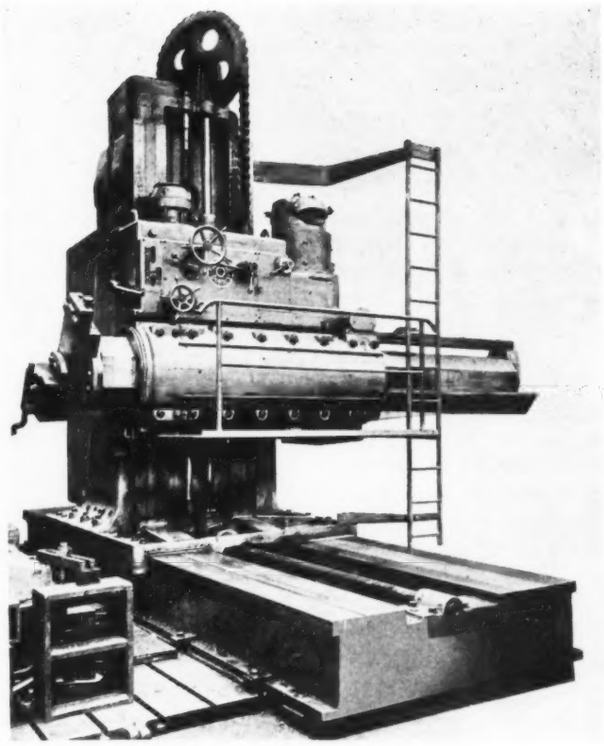
Molybdenum alloy castings are coming into general use, and chromium-molybdenum steels are be-



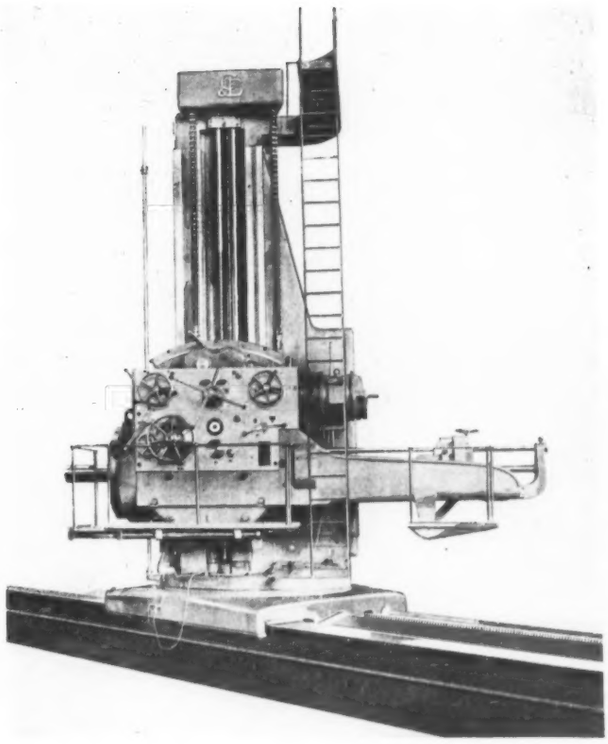
Herbert Lindner New Small-size Jig Boring Machine with a Table Working Capacity of 12 by 22 Inches. The Precision Setting is by Micro-optic Means. The Maximum Movement of the Spindle is 15 3/4 Inches, of which Nearly 6 Inches is by Automatic Feed. All Speeds from 70 to 2100 R.P.M. are Obtainable by a "Stepless" Drive. Automatic Feed of Approximately 0.001, 0.003 and 0.008 Inch is Obtainable for Each Revolution of the Spindle



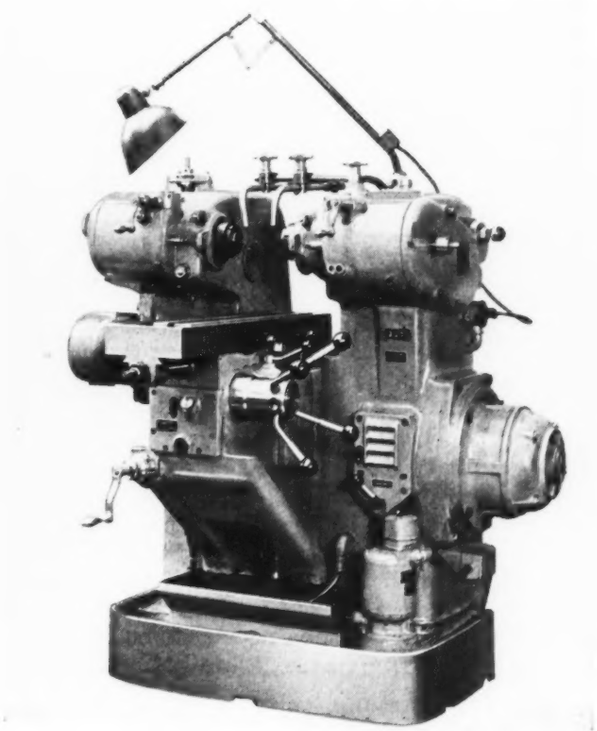
Alfred H. Schuette "Forst" Vertical External and Internal Type Broaching Machine, Representing Modern German Developments in This Field. For Either Mode of Operation, the Machine Has a Maximum Stroke of 44 Inches and is Designed for a Maximum Pull of 17,500 Pounds. Larger Sizes are also Available. The Motion of the Broaches in Both Cases is Downward



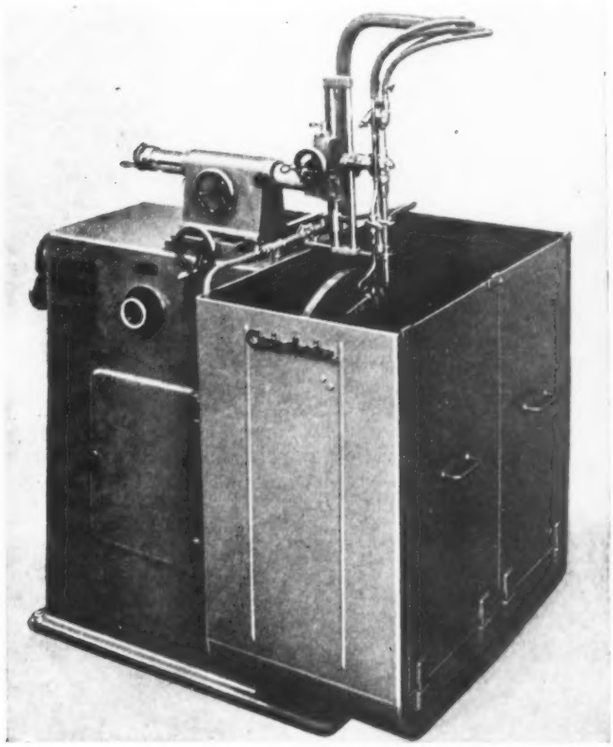
Schiess "Portable" Shaper of Huge Dimensions Intended to be Moved to a Suitable Position for Machining Very Large Work. The Machine Has a Stroke of 5 Feet and can be Moved 13 Feet 4 Inches along the Bed; It Weighs 110,000 Pounds



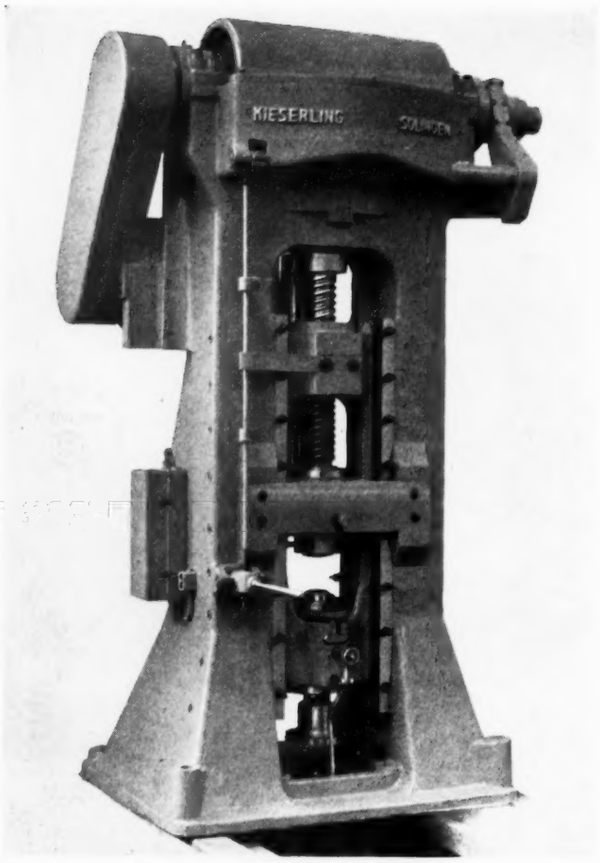
Collet & Engelhard Horizontal Boring and Milling Machine of Large Size. The Spindle is 9 Inches in Diameter, and it can be Adjusted from 4 1/2 Feet to 15 Feet over the Table Surface. The Machine Weighs over 200,000 Pounds



A Two-spindle Horizontal Milling Machine with Table Surface 8 by 28 Inches, Built by Fritz Werner. The Table is Slightly Inclined to Permit Chips and Coolant to be Easily Removed



"Griesheim" Automatic Hardening Machine for the Flame-hardening of Gear Teeth, Rollers, and Other Cylindrical Work. Time for Heating Various Types of Work is Preset on a Scale



A Kieserling & Albrecht Friction Screw Press Illustrating Present Developments in This Type of Equipment, with the Drive Completely Enclosed in the Frame and the Former Large Taper Driving Disks Eliminated. The Slide or Ram is Counterbalanced by Compressed Air instead of by Counterweights

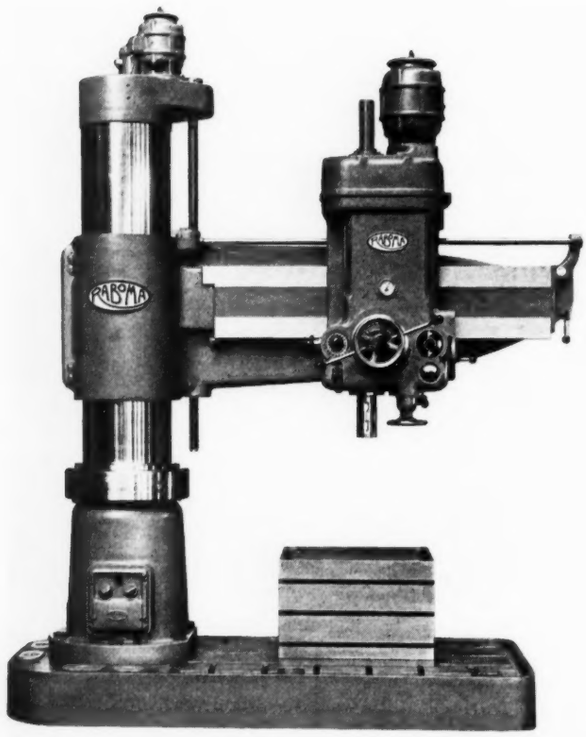
ing introduced as a substitute for chromium-nickel steels, especially for spindles and gears. Because of the scarcity of nickel in Germany, the nickel content in the cast iron used in machine beds and columns has been reduced to a minimum or has been entirely avoided. The required rigidity is being obtained by more careful design of cross-sections and the correct arrangement of ribs. To save materials, counterweights are even being replaced by suitable mechanical arrangements, and light metals or synthetic plastics are commonly used for parts in cases where great strength is not required or where weight reduction may be of importance.

Complete covers over lathe and turret lathe beds were in evidence. Inclined tables on milling machines to facilitate the removal of chips and cutting fluid were to be seen not only on machines of the Lincoln type, but in one instance, on a knee type milling machine, where the table is inclined from end to end 5 degrees. Considerable attention is being given to the disposal of chips and coolant on other machines as well. On one line of lathes and turret lathes, the bed is arranged to dispose of the chips toward the rear, and the channels and pans on various types of machines have been widened to provide, on one hand, ample chip space and, on the other, facilities for the disposal of the chips.

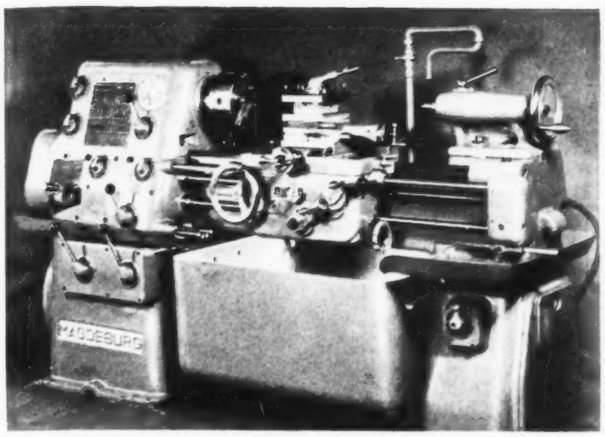
Another trend worthy of mention is the increase in size of "portable" machines. A portable shaper was on exhibit weighing 110,000 pounds; this machine is portable in the sense that it can be conveniently carried by a crane from one part of the shop to another and placed in position for performing its work without moving the casting being operated upon. Holes are provided through the massive frame for bars by means of which the entire machine can be conveniently lifted and moved.

The method of transferring movements from a former or templet to the work-spindle or tool carriage by electric means—as best exemplified in American machine tool practice by the Keller type die-sinking and engraving machine—has been applied to machines of different types, especially lathes and other machines for form-turning.

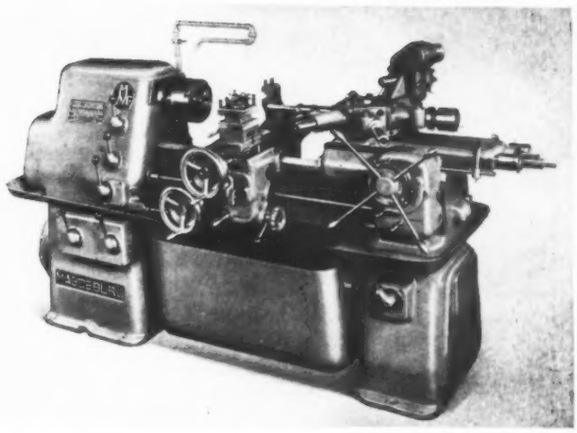
Increasing use is being made of push-button control. In a few instances, signal lights were observed to indicate the overheating of bearings. In at least one case, the machine is automatically shut down if the bearings become too hot. In another



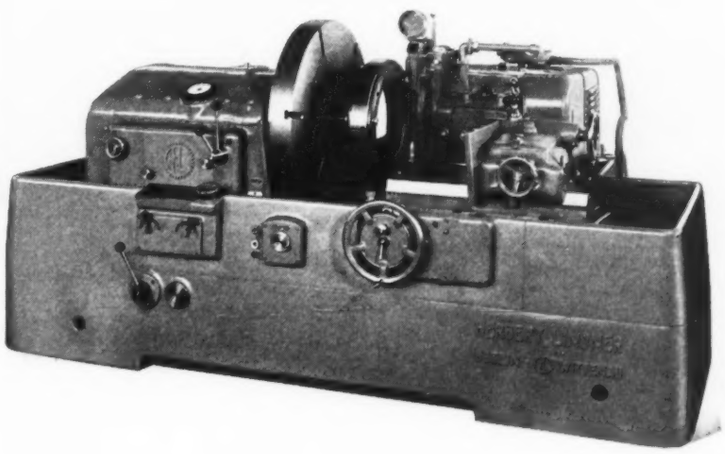
Raboma Radial Drilling Machine Provided with Hydraulic Clamping of the Sleeve, and of the Cross-slide to the Arm. The Feed and Speed Changes are also Accomplished Hydraulically



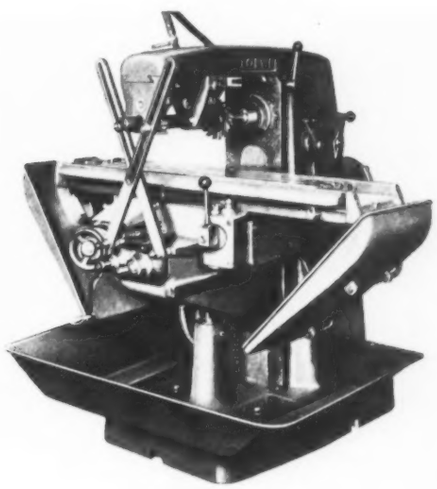
Engine Lathe of Recent Design, Representing a Modern German Type of Lathe, as Built by the Magdeburger Werkzeugmaschinenfabrik



Magdeburger Turret Lathe, Evolution of the Lathe Shown at the Left, so Designed that Many of the Major Parts of the Two Machines Interchange



Herbert Lindner Thread Grinder for Large Sizes of Threads, as for Gages in the Oil Industry. The Machine is Provided with Micro-optic Means for Observing the Wheel and Thread Profiles, which, much Enlarged, Appear on a Screen, Aiding in Accurately Adjusting the Wheel. The Machine Has a Capacity for Grinding External Threads up to 28 Inches in Diameter by 12 Inches in Length, and Internal Threads up to 8 Inches in Length. It is Provided with Means for Grinding Taper Threads



Horizontal Milling Machine with Electromechanically Controlled Automatic Table Cycle, Built by the Loewe-Fabriken. The Spindle Reverses Automatically, so that by Using Right- and Left-hand Cutters, it will Cut as the Table Feeds in Either Direction, a Loading Fixture being Provided at Each End

case, there is an interlock between the pump motor and the main drive, so that it is impossible for the machine to be started until the oil pump is in operation.

Ground gears appear to be very generally used, and multi-spline shafts are frequently employed instead of the ordinary type shafts with keys and keyways.

Among the unusual new developments should be mentioned a profile milling machine which, while not exhibited, was said to be ready for the market. On this machine, two photo-electric cells control the movements of the work and the cutter-spindle directly from drawings, without the use of any model or pattern. A regular line drawing is traversed beneath the two electric eyes and scanned by them. The resulting impulses are amplified by relays to control magnetic clutches and other electrical equipment. At the completion of each operation, the drawing, which is wound up on a drum, is reversed for the next cycle.

* * *

A large aircraft engine plant is being established in the Hillington industrial area near Glasgow, Scotland, by Rolls-Royce, Limited. It is said that this is the largest engineering development that has taken place on the Clyde during the last thirty years. The new works are expected to employ 10,000 people when completed. The plant will occupy approximately sixty acres of ground.

Laying out a Commercial Heat-Treating Plant

By LAWRENCE R. FOOTE, Industrial Gas Engineer
Central Illinois Electric & Gas Co., Rockford, Ill.

SOME two or three years ago, O. T. Muehlemeyer, who had operated a heat-treating plant in Rockford, Ill., for about twenty-five years, found it necessary to increase the facilities of his shop. In building an entirely new plant, he incorporated some of the features that long experience in the commercial heat-treating field had shown him to be necessary for the efficient handling of a great variety of work. The plant has now been in operation for over two years. The lay-out has proved to be well suited to the work to be done, and for that reason may prove of interest and value to others engaged in this branch of the industry.

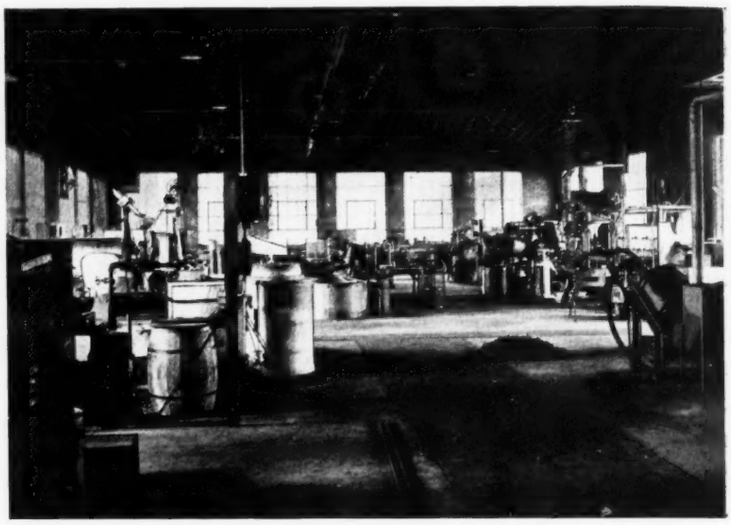


Fig. 1. Interior of Muehlemeyer Commercial Heat-treating Plant

Fig. 1 shows a comprehensive view of the interior of one end of the plant, while Fig. 2 indicates the lay-out. Of particular interest is the arrangement. It will be noted that all furnaces and equipment relating to one phase of heat-treatment are placed together as a unit. Also, it will be observed that all overhead air and gas piping is conspicuous by its absence, these lines all being carried in trenches beneath the floor, as shown by the dotted lines in Fig. 2. The main gas header is carried transversely across the shop with supply legs running to each line of furnaces. Four individual blowers supply combustion air to the four furnace lines. This arrangement has the advantage of making it unnecessary to run a large sized blower, capable of supplying air to all the furnaces, when only a few of the furnaces are being operated.

Another feature is the planning for the flow of work through the shop. All work enters at the door marked "Entrance," which is large enough to permit a truck to drive right into the plant. When the work is finished, it leaves by the door marked "Exit."

It will be noted in the plan of the shop that there are five main departments: Tool hardening, carburizing, high-speed steel hardening, blast clean-

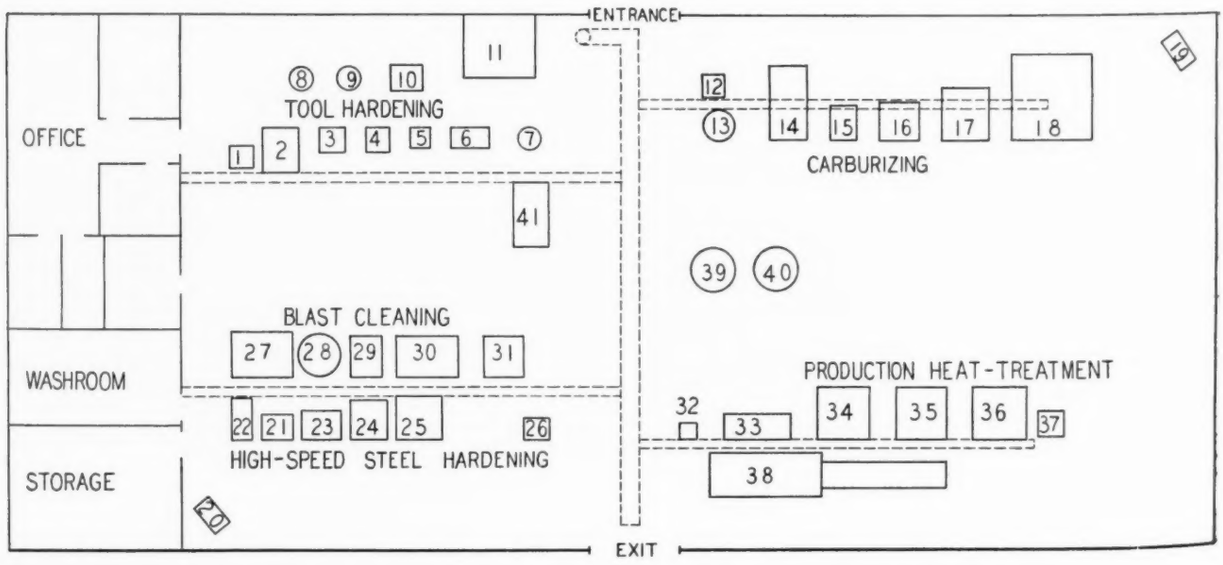


Fig. 2. Plan of a Heat-treating Plant Laid out for Handling a Variety of Work

ing, and production heat-treatment. The dimensions of the shop proper, exclusive of office, washroom, etc., are 60 by 120 feet.

In order to indicate what kind of equipment is deemed suitable for a plant of this kind, each of the furnaces and other important equipment is numbered in the plan view, the following list being

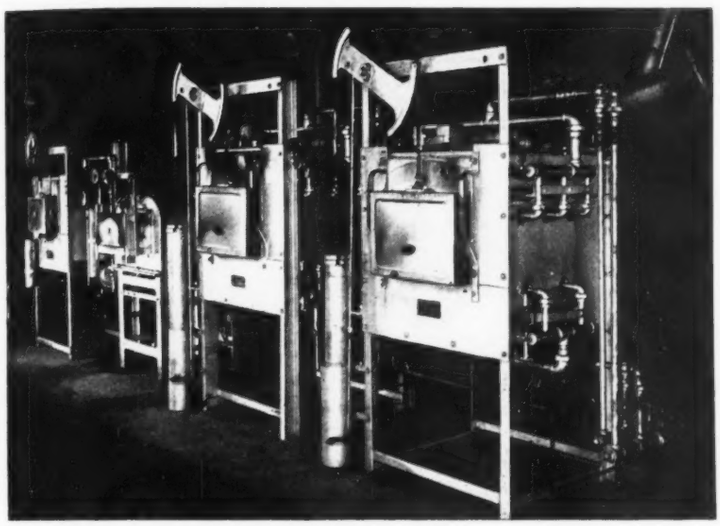


Fig. 3. Equipment Used for Hardening High-speed Steel

a key to the equipment: 1. Two-H.P. Spencer turbo-blower. 2. American Gas Furnace Co.'s oven furnace. 3 and 4. Standard Fuel Engineering Co.'s oven furnaces. 5. American Gas Furnace Co.'s oven furnace. 6. Salt bath tempering furnace. 7. Eclipse soda wash kettle. 8, 9, and 10. Quenching tanks. (11. Shop office.) 12. Eclipse blower. 13. Circular lead bath. 14. American Gas Furnace Co.'s oven furnace. 15 and 16. Eclipse oven furnaces. 17. Stewart oven furnace. 18. American Gas Furnace Co.'s oven furnace. 19 and 20. Humphrey unit heaters. 21. American Gas Furnace Co.'s positive pressure blower. 22. Oven furnace. 23. Preheater. 24. Oven furnace. 25. Oven furnace. 26. Bench forges. 27. Ingersoll-Rand air compressor. 28. Air receiver. 29 and 30. Pangborn cabinet and separator. 31. Sly blast mill. 32. Spencer turbo-blower. 33. "General" straightening press. 34. American Gas Furnace Co.'s rotary carburizing machine. 35 and 36. Tempering machines. 37. Blakeslee degreaser. 38. American Gas Furnace Co.'s heating machine. 39 and 40. Oil and water quenching tanks. 41. Lindberg Cyclone drawing furnace.

Figs. 3 and 4 show sections of the plant indicating the arrangement of the equipment. Fig. 3 shows the section devoted to the hardening of high-speed steel, while in Fig. 4 are seen the gas carburizing and the rotary tempering furnaces.

British Machinery Industries

The British machinery industry is as busy as at any time in its history. Not only is the domestic market extremely active due to the rearmament program, but orders for export are being received at an exceptionally high rate. Numerous plants are being extended and the number of workmen employed increased.

Last year, machinery became for the first time the largest single item in Great Britain's export list, the total shipments being valued at approximately $275,000,000. This condition has been maintained during 1939. During the first five months of the year, the exports of machinery reached a figure of approximately $115,000,000. Among the leading buyers of British-made machinery are India, South Africa, the Soviet Union, and Australia. The total exports of machine tools have risen by over 50 per cent for the first five months of the year, as compared with the corresponding period in 1938. The Soviet Union is a large buyer of this class of machinery. Textile machinery, of course, constitutes a large item—in fact, it represented the largest single item in the machinery export list.

* * *

Standardization of Buffing Wheels

Simplified Practice Recommendation R115-30, pertaining to full-disk buffing wheels, has been readopted without change by the Standing Committee of the buffing wheel industry. Copies of the recommendation can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

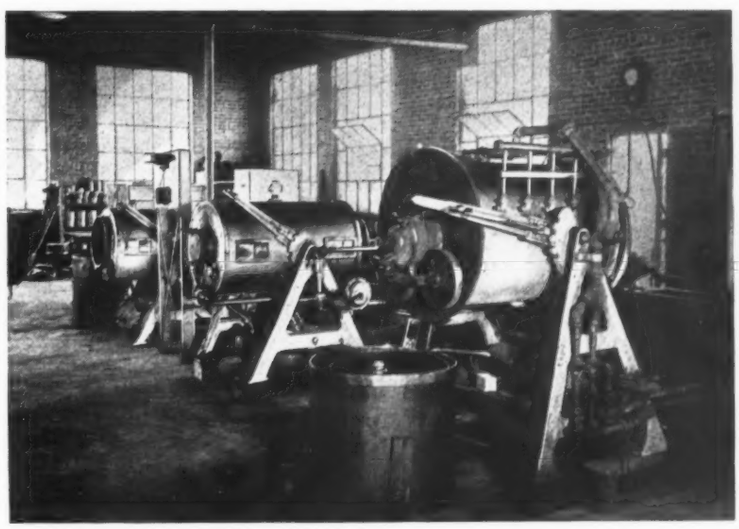
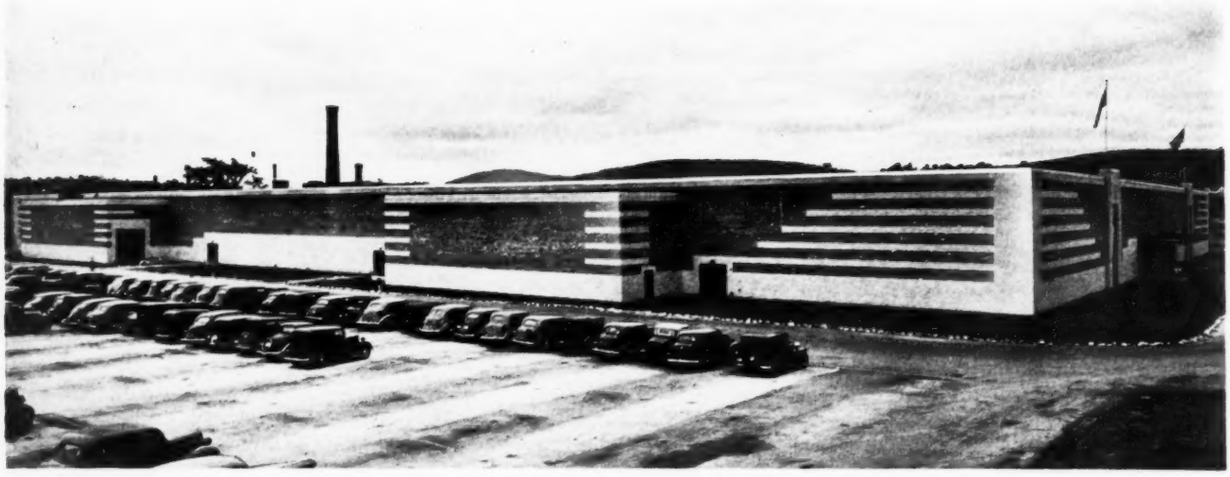


Fig. 4. Gas Carburizing and Rotary Tempering Furnaces



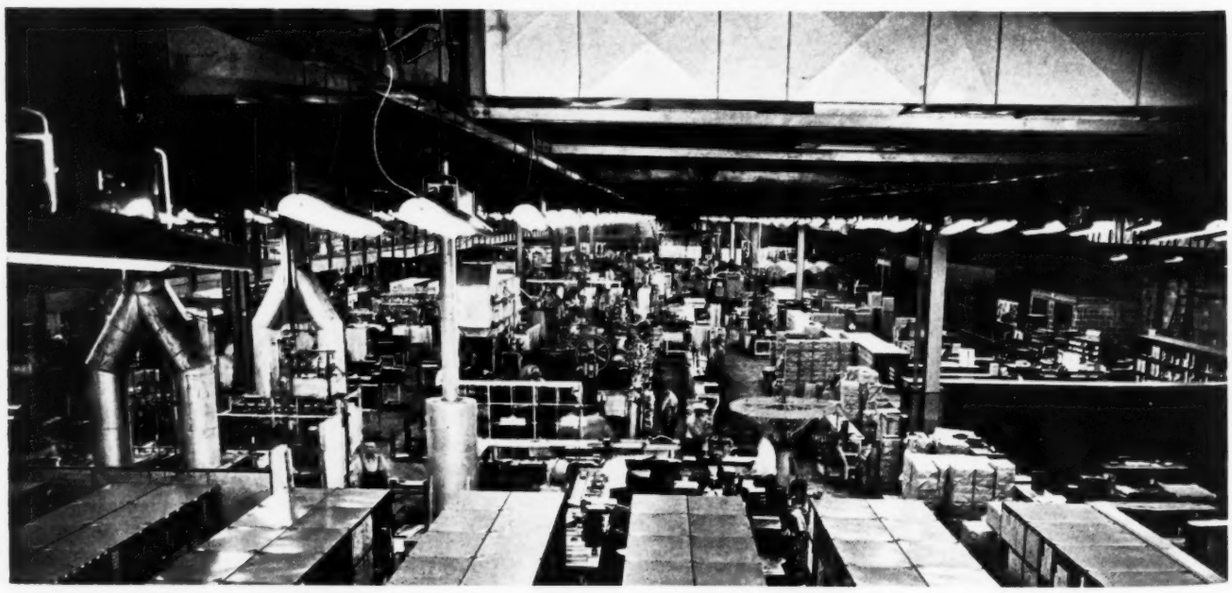
Simonds Windowless Shop—the "Plant of Tomorrow"

THE world's first windowless factory—built for the Simonds Saw & Steel Co. at Fitchburg, Mass., by the Austin Co.—is now in complete operation. All manufacturing operations formerly carried out in three plants having a total area of 17 1/2 acres are now performed in the five-acre single room of this "Plant of Tomorrow." The exterior walls of the building are built solidly from red brick decorated with buff-colored face brick.

There are eight self-contained production lines, each including all of the forging, machining, heat-treating, and finishing equipment required for producing saws, machine knives, files, and other products of the concern. These production lines can be observed for their entire length, as seen in Fig. 1, from an overhead walkway which runs around the entire building. Two shifts of employes work eight hours a day and five days a week.

The light never varies in this windowless shop, being supplied by over fourteen hundred 100-watt fluorescent tubes which provide a blanket of "cold" light over everything. All shadows are eliminated, and from 20 to 25 foot-candles of light reach the working plane in all directions.

The atmosphere is kept clear, cool, and comfortable, despite the presence of seventy heat-treating furnaces and more than a thousand individually driven machines which are constantly throwing off grinding particles, oil vapor, etc. Large air-conditioning units circulate 400,000 cubic feet of air per minute through 3000 lineal feet of overhead ducts. This insures five complete air changes every hour. Automatic controls insure comfortable working temperatures throughout the summer. All used air is exhausted through forty-two ventilators that are provided in the roof of the building.



Seven Hundred Employes Work in the Simonds Windowless Factory under Completely Controlled Light, Atmospheric, and Acoustic Conditions

A cork-filled ceiling and walls of acoustic brick absorb approximately 90 per cent of the noise created by the long production lines of machinery. Because of this noise absorption, no partition has been found necessary between the office and the shop. The telephone switchboard operator can perform her duties efficiently in the open office and stenographers take dictation given in a normal voice. Four big drop-hammers, which forge the teeth for inserted-blade saws and perform similar operations, are supported on special foundations that are separated from the other sections of the floor by shock-absorbing materials, but they are not otherwise isolated from nearby equipment, which includes that of a metallurgical laboratory.

* * *

New Type of "Mining" Operations

In many parts of the British Isles, there is intense activity in underground mining operations. Vast galleries and caverns are being hollowed out, not to recover minerals, but to protect human beings during air raids. Modern methods of conducting warfare are destined, it seems, to make moles of men.

There is a touch of irony in this. Man once lived in a cave, and there was little to distinguish him from other animals. As the result of biological evolution his brain developed, and he emerged into the sunlight and built himself a home above ground. Then came what we know as civilization, and with it increasing comfort and greater security against the ravages of disease and the attacks of enemies. But with the further development of this creative instinct, man invented powerful explosives, poisonous gases, machine guns, and death-spitting cannons. Then he made the airplane to speed messengers of destruction and terror to far-off places. The circle seems to be completing itself; and now we find mankind digging in again. It all seems unbelievable, and we hope that the world will soon awake and find that it has merely had a bad dream.—*Compressed Air Magazine*

* * *

Usually we think of automobiles as produced mainly from metal products; yet great quantities of agricultural products are required in building motor cars. The Pontiac Motor Co., for example, points out that to build 200,000 cars the company uses the agricultural products of 100,000 acres of land, including close to 14,000,000 pounds of cotton for tires, brake linings, etc.; 100,000 bushels of corn for butyl alcohol and starch; 500,000 gallons of molasses for solvents, anti-freeze and shock-absorber fluids; 640,000 pounds of wool for upholstery and floor coverings; 70,000 pounds of goat hair for mohair upholstery; 400,000 pounds of turpentine for solvents, paints, and adhesives; 13,800,000 pounds of rubber for numerous applications in addition to tires; and 24,400,000 feet of lumber for packing and other purposes.

Flame-Descaling a Nine-Ton Steel Casting

Flame-descaling is a relatively new process for removing scale from blooms, billets, slabs, forgings and steel castings by means of especially designed oxy-acetylene heating heads. The process is based on the principle that when high-temperature heating is applied to the scale or oxide skin on a piece of cold metal, the scale expands and breaks away from the base metal, due to the different rates of expansion of the scale and the steel.

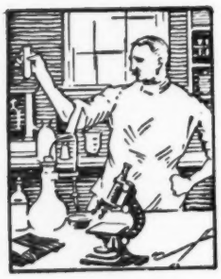
The accompanying illustration shows a flame-descaling operation being performed on a steel casting for a hydraulic turbine. This casting was flame-descaled in one half the time formerly required for chipping. The illustration was obtained through the courtesy of The Linde Air Products Co., New York City.

Removing Scale from a Large Steel Casting with Oxy-acetylene Heat

* * *

There is more to the spirit of the peoples of the dictatorships than mere willingness to hazard life in warfare. There is a continuing willingness day by day to sacrifice and toil for the nation and to rejoice in so doing. Unless the democracies—unless America—can revive this spirit, the dictatorships will survive and the democracies decay.... What America asks of us is that individuals and classes and occupations should cease their efforts for selfish subsidy from the national government, and that we should reject narrow, selfish advantage for the common good—in which alone our own prosperity and safety finally lie.—*Ralph E. Flanders, President, Jones & Lamson Machine Co.*

MATERIALS OF INDUSTRY



THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

Meehanite Metal of Increased Hardness and Improved Machinability

A new type of Meehanite metal known as Super A, which has recently been developed by the Meehanite Research Institute of America, Inc., provides a great increase in hardness and wearing qualities, accompanied by an actual improvement in machinability. For example, Super A Meehanite with a hardness of 269 Brinell machines 20 per cent faster than alloy cast iron of 207 Brinell. This is believed to be the first time that it has been possible to obtain increased hardness in a metal without, at the same time, making the material more difficult to machine.

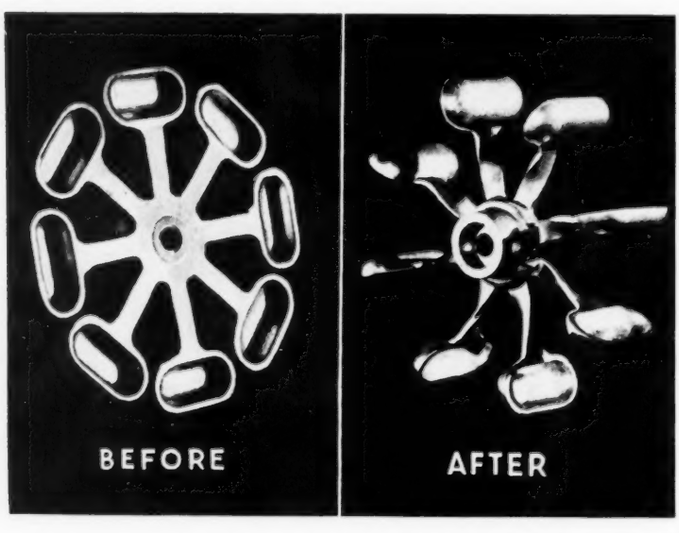
Super A is an alloyed Meehanite, in which copper is used largely as the base alloy. It has been found particularly well adapted to the construction of internal combustion engines, marine cylinders, and machinery of the type in which smooth running qualities are of primary importance. It is also used in the manufacture of large gears, piston-rings, and other parts that operate under severe wearing conditions. The metal has a high modulus of elasticity, a good degree of toughness, and a tensile strength in excess of 50,000 pounds per square inch. In fact, no values are below the requirements that are specified for a good No. 50 A.S.T.M. iron.

Another Meehanite alloy known as Super WH has also been brought out; this alloy is unusually wear resistant and possesses a good combination of physical properties. It can be produced with a hardness up to 578 Brinell, and has been found practical for castings subjected to extremely severe wear, such as ball-mill liners, muller tires, and pan bottoms.

The production of these two new types of metal is covered by patents issued to the Meehanite Metal Corporation, Pittsburgh, Pa. 201

Ductility of Zinc Permits Twisting Arms of an Impeller Die-Casting

A zinc impeller casting, with eight arms flat as the part comes from the die-casting machine, is shown at the left in the accompanying illustration. At the right is seen the same casting with the arms twisted through 90 degrees to bring the impeller cups parallel with the axis of the part. This method of making the impeller greatly simplified the casting problem. It was possible only because of the high ductility that is now obtainable in zinc alloys.



Zinc-alloy Die-casting before and after Twisting Arms through 90 Degrees

This casting is produced from No. 5 Zamak alloy, a product of the New Jersey Zinc Co., 160 Front St., New York City, which has a composition of 4.1 per cent aluminum; 1 per cent copper; 0.03 per cent magnesium; 0.075 per cent iron, maximum; 0.003 per cent lead, maximum; 0.003 per cent cadmium, maximum; 0.001 per cent tin, maximum; and the remainder zinc.

The physical properties of this alloy as cast are: Tensile strength, 45,500 pounds per square inch; compression strength, 87,300 pounds per square inch; shearing strength, 38,400 pounds per square inch; modulus of rupture, 105,000 pounds per square inch; impact strength of 1/4- by 1/4-inch test bars, 18 foot-pounds; and hardness, 79 Brinell. 202

To obtain additional information about materials described on this page, see lower part of page 890.

Nickel Has Helped to Solve Television Problems

Television, the latest miracle of the electrical and radio industries, has become possible largely because of the availability of the proper materials. The heart of the television set is the cathode ray tube, which is a device for translating a delicate electrical impulse into visual patterns. From a heated mass of metals, coated with suitable chemicals, emanates electrons. These are formed into a stream or beam by elements in the tube and are projected on a fluorescent screen. The impinging of the electrons on the screen causes the visible illumination of the screen at the point of impact.

The elements of the cathode ray tube comprise an intricate assembly of cylinders, deflecting plates, and a cathode, these parts being made of nickel. In a precautionary measure, taken to eliminate undesirable elements after the air has been evacuated from the tube, a "bombardment" is conducted on the metal parts, which is accomplished by heating them at temperatures up to 1850 degrees F. through high-frequency induction.

The metals used in these devices must possess a number of mechanical, electrical, and chemical characteristics, as follows:

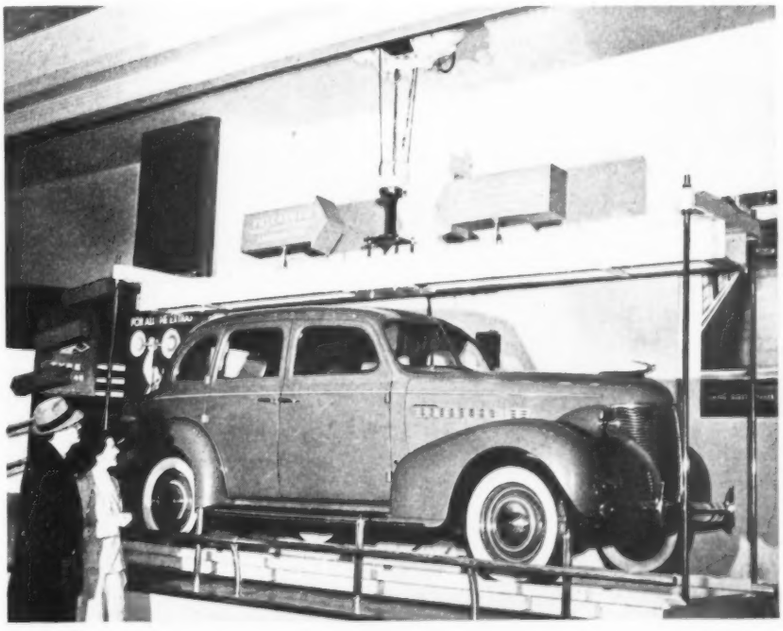
(1) Must be amenable to production processes that involve a wide variety of fabricating operations. Even in the softest temper, they must be sufficiently strong to avoid deformation during normal handling and use. (2) Must remain strong at high temperatures, in order to preserve tube characteristics through evacuation and bombardment. (3) Must have a high modulus of elasticity, particularly at high temperatures. (4) Must permit strong spot-welds, since this is the method of joining the parts together. (5) Must be rustproof and resistant to corrosion. (6) Must resist warpage and distortion, regardless of high temperatures during manufacture and use. The position and clearance of the various parts are vital factors in maintaining the proper tube operation. (7) Must have the required electrical properties, especially proper electron emission characteristics. (8) Must be low in contained gas and be readily de-gasified at moderate temperatures.

All these requirements are met by nickel and non-magnetic alloys having a high nickel content, such as K Monel metal and Inconel. It is estimated that the new industry will require a considerable tonnage of nickel and nickel alloys, as television sets require from sixteen to thirty-two cathode ray tubes each. 203

Kennametal Used for Pump Valves Subject to Abrasion

Kennametal, the intermetallic compound of tungsten-titanium-carbide manufactured by the McKenna Metals Co., 147 Lloyd Ave., Latrobe, Pa., has been found especially suitable for pump and other valves that are subject to unusual abrasive or corrosive action. In one instance, where it was previously necessary to change as many as seven valves in twenty-four hours, Kennametal-tipped valves and seats are said to give such good service that only one valve has to be replaced every one or two weeks.

The strength of Kennametal balls and seats for oil-well pump valves was demonstrated in recent tests, in which the balls were hammered against the seats by a pneumatic ram which struck 300 blows per minute. Air pressure of 25 pounds per square inch was used and there was 3/32 inch of play between the ram and the ball and seat. After 105 minutes of hammering, the valves were still serviceable. 204



A rubber cylinder, 4 inches in diameter by 6 inches long, picks up an automobile every 15 minutes in the exhibit of the B. F. Goodrich Co. at the New York World's Fair. The car weighs approximately 4800 pounds, and it is lifted several inches off the platform. The rubber is bonded at each end by the Vulcalock Process to a steel disk; thus the demonstration dramatizes not only the strength of the rubber, but also the strength of the bond.

To obtain additional information about materials described on this page, see lower part of page 890.

NEW TRADE LITERATURE

Recent Publications on Machine Shop Equipment, Unit Parts and Materials. To Obtain Copies, Check on Form at Bottom of Page 889 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the August Number of MACHINERY

Cemented-Carbide Tools

CARBOLOY COMPANY, INC., 1147 E. Eight Mile Road, Detroit, Mich. Engineering bulletin GT-114, giving recommendations for the selection of the proper grade of Carboloy for cutting steel, cast iron, non-ferrous metals, and non-metallic materials, suggested speeds and feeds, and a method of determining power requirements. Bulletin GT-115, entitled "A Guide to the Characteristics and Uses of All Carboloy Cemented-Carbide Grades." 1

Turret Lathe Tools

GISHOLT MACHINE CO., 1209 E. Washington Ave., Madison, Wis. Catalogue covering the complete line of Gisholt standard tools and holding devices, which are adapted for a wide range of work on ram type universal turret lathes, high-production turret lathes, and heavy-duty turret lathes. Various applications are illustrated. 2

Methods of Cleaning Metals

OAKITE PRODUCTS, INC., 26 Thames St., New York City. Catalogue commemorating the thirtieth anniversary of the founding of the company. Typical examples are shown of the almost limitless applications of Oakite cleaning products and methods, which are in use in practically every branch of industry. 3

Machining Zinc-Alloy Die-Castings

NEW JERSEY ZINC CO., 160 Front St., New York City. Booklet containing detailed information on the best practice to follow in machining zinc alloy die-castings, based on the actual experience of machine tool manufacturers, die-casters, and die-casting users. 4

Electric Equipment

GENERAL ELECTRIC CO., Schenectady, N. Y. Bulletin GEA-3143, descriptive of indoor, station type circuit-breakers. Bulletins GEA-137D, 1960A, and 2964A, describing, respectively, low-speed synchronous motors; low-speed synchronous generators; and a new magnetic motor starter. 5

Screw Machines

BROWN & SHARPE MFG. CO., Providence, R. I. Catalogue illustrating and describing the construction features of Brown & Sharpe wire feed screw machines, designed with a view to obtaining ease of operation, rapid production, versatility, durability, and low operating cost. 6

Folders and Brakes

NIAGARA MACHINE & TOOL WORKS, 637 Northland Ave., Buffalo, N. Y. Bulletin 74-A, covering Niagara manually and power operated folders and brakes for sheet-metal work, such as fabricating metal cabinets, air-conditioning ducts, and a wide variety of parts. 7

Electric Equipment

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa. Circular F-8490, descriptive of the "Thermoguard," an automatic device for protecting fractional-horsepower motors from burnouts. Leaflet F-8487, descriptive of motors and motor parts for industrial oil burners. 8

Manganese Steel

AMERICAN MANGANESE STEEL DIVISION OF THE AMERICAN BRAKE SHOE & FOUNDRY CO., Chicago Heights, Ill. Catalogue 59, entitled "Amsco Manganese Steel — The Toughest Steel Known," describing the properties and applications. 9

Grinding Machines for Armament Work

NORTON CO., Worcester, Mass. Circular entitled "Norton Machines in Armament Production," illustrating typical applications of Norton grinding and lapping machines in the aviation industry and in arsenal work. 10

Heat-Treating Equipment

LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia, Pa. Folder N33B (2), descriptive of the Rayotube temperature detector which supplies continuous data from points never before detectable. Typical applications are illustrated. 11

Automatic Stub Lathes

SUNDSTRAND MACHINE TOOL CO., 2530 Eleventh St., Rockford, Ill. Bulletin 391, descriptive of Sundstrand Models 8, 10, and 12 automatic Stub lathes, suitable for a wide variety of long- and short-run turning operations. 12

Precision Length Standards

GEORGE SCHERR CO., INC., 128 Lafayette St., New York City. Bulletin illustrating and describing Ultra-Chex precision length standards or blocks, accurate to eight millionths of an inch, for checking and setting micrometers and other precision instruments. 13

Welding Equipment

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa. Booklet B-2205, entitled "Tips on Building Your Own Gas Welder," intended especially for small shops or maintenance departments of large organizations. 14

Chrome Rack Coating Material

UNITED CHROMIUM, INC., 51 E. 42nd St., New York City. Folder containing complete information on a new material known as "Unichrome," for coating plating racks of all descriptions, that is not affected by boiling cleaners or by plating solutions. 15

Blast Cleaning Machines

PANGBORN CORPORATION, Hagerstown, Md. Bulletin 211, on the complete line of standard and auxiliary "Rotoblast" airless cleaning tables, and their use for cleaning flat and fragile metal parts, heat-treated parts, etc. 16

Welding Equipment

LINCOLN ELECTRIC CO., Cleveland, Ohio. Application Sheet No. 65, entitled "Economics of Welding in Machine Design," containing actual figures covering welding costs in producing a butt joint. 17

Threading Machines

LANDIS MACHINE CO., INC., Waynesboro, Pa. Bulletin H-75-4, illustrating and describing the important features of Landmaco threading machines, and listing the various sizes, capacities, etc. 18

Roller Bearings

TIMKEN ROLLER BEARING CO., Canton, Ohio. Circular entitled "Hey, What Goes on Here?," giving facts about roller bearings and the prominent part they play in modern American railroading. 19

Design Data on V-Belt Drives

MANHATTAN RUBBER MFG. DIVISION OF RAYBESTOS-MANHATTAN, INC., 34 Townsend St., Passaic, N. J. New engineering data book containing material of value to designers of V-belt drives. 20

Certified Steels

JOSEPH T. RYERSON & SON, INC., 16th and Rockwell Sts., Chicago, Ill. New Ryerson stock list of certified steels in the form of structural shapes, plates, bars, tubes, etc., ready for immediate shipment. 21

High-Nickel Alloys

INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York City. Folder containing information on the mechanical, corrosion-resistant, and other properties of rolled nickel, Monel, and other high-nickel alloys. 22

Steam Turbines

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis. Circular entitled "It Pays to Buy the Equipment that Pays for Itself," illustrating several installations of Allis-Chalmers steam turbines and pumps. 23

Taps and Dies

WINTER BROS. CO., Wrentham, Mass. Catalogue 18, containing valuable information and tables designed to simplify the selection of the right tap or die for any threading job. 24

Portable Electric Tools

JAS. CLARK, JR. ELECTRIC CO., Louisville, Ky. General catalogue 39, covering the latest models of Clark electric drills, sanders, and grinders for use in automotive, aeronautical, and general industrial work. 25

Ball-Bearing Units

STEPHENS-ADAMSON MFG. CO., Aurora, Ill. Catalogue 739, descriptive of "Sealmaster" permanently sealed, prelubricated, self-aligning ball-bearing pillow blocks, flange units, and take-up units. 26

Tanks for Pressure Blast Cleaning

W. W. SLY MFG. CO., 4700 Train Ave., Cleveland, Ohio. Bulletin 95, descriptive of the Sly Type PB blast tank for quick and economical pressure cleaning. 27

Carbide-Tipped Masonry Drills

SUPER TOOL CO., 21650 Hoover Road, Detroit, Mich. Chart listing the correct sizes of Super carbide-tipped masonry drills for various makes and sizes of expansion shields or anchors. 28

Material-Handling Equipment

ALVEY CONVEYOR MFG. CO., Broadway, Wyoming, and Seventh Sts., St. Louis, Mo. Circular illustrating applications in which Amco conveyors have reduced handling costs. 29

Precision Grinders

STANDARD ELECTRICAL TOOL CO., Cincinnati, Ohio. Bulletin 162, cov-

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To Obtain Copies of New Trade Literature

listed on pages 888-890 (without charge or obligation) mark with X in the squares below, the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail to:

MACHINERY, 148 Lafayette St., New York, N. Y.

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24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46

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[SEE OTHER SIDE]

ering Type B P A precision internal-external grinders designed for application to lathes, planers, milling machines, etc. 30

Electric Motors

WAGNER ELECTRIC CORPORATION, 6400 Plymouth Ave., St. Louis, Mo. Loose-leaf bulletin 182, giving latest data on Wagner polyphase squirrel-cage and slip-ring motors. 31

Methods of Machining Bakelite-Laminated

SYNTHANE CORPORATION, Oaks, Pa. Wall chart containing instructions for machining Bakelite-laminated, illustrated by views showing different machining operations. 32

Sheet-Metal Working Machinery

WARD MACHINERY CO., 564 W. Washington Blvd., Chicago, Ill. Catalogue illustrating and describing machines, tools, and supplies for fabricating sheet metal. 33

Ball and Roller Bearings

GWILLIAM CO., 360 Furman St., Brooklyn, N. Y. Catalogue 16, listing the various types of Gwilliam ball and roller bearings, together with standard sizes. 34

Electric Hoists

CHISHOLM-MOORE HOIST CORPORATION, Tonawanda, N. Y. Bulletin 138, pointing out the low operating cost and features of construction of the new Comet electric hoist. 35

Industrial Heating Appliances

AMERICAN GAS FURNACE CO., Elizabeth, N. J. Revised booklet 601, covering small heating gas appliances, including burners, blowpipes, furnaces, etc. 36

Graphic Recording Instruments

ESTERLINE-ANGUS CO., Indianapolis, Ind. Bulletin 339, descriptive of the Esterline-Angus sensitive recorder for recording minute currents and voltages. 37

Pneumatic Die Cushions

DAYTON ROGERS MFG. CO., Minneapolis, Minn. Bulletin 5-1, descriptive of the company's new Model C line of pneumatic die cushions for power presses. 38

Hydraulic Presses

LAKE ERIE ENGINEERING CORPORATION, Buffalo, N. Y. Bulletin 139, announcing a new line of hydraulic high-production presses known as "Streamliners." 39

Friction Clutches

CARLYLE JOHNSON MACHINE CO., Manchester, Conn. Catalogue descriptive of Johnson standard type friction clutches and "Super-Johnson" type clutches. 40

Welded Trucks

ALL STEEL WELDED TRUCK CORPORATION, Rockford, Ill. Bulletin L-212, descriptive of the new Clark steel-weld truck, of light-weight low-cost design. 41

Speed Reducers

JANETTE MFG. CO., 556 W. Monroe St., Chicago, Ill. Bulletin 22-11, illustrating and describing Janette motorized and motorless speed reducers. 42

Visual Gages

SHEFFIELD GAGE CORPORATION, Dayton, Ohio. Circular listing ten features of Sheffield visual gages for production and inspection gaging. 43

Tantalum-Carbide Tool Blanks

VANADIUM-ALLOYS STEEL CO., VASCOLOY-RAMET DIVISION, North Chicago, Ill. Revised price lists for Vascoloy-Ramet standard tool blanks. 44

Swivel Vises

FRAY-MERSHON, INC., Glendale, Calif. Circulars descriptive of the portable, multi-swivel, All-Angle toolmaker's vise. 45

Cranes

WHITING CORPORATION, Harvey, Ill. Booklet entitled "How to Write a Traveling Crane Specification." 46

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described on pages 891-901 is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment mark with X in the squares below, the identifying number found at the end of each description on pages 891-901 — or write directly to the manufacturer, mentioning machine as described in August MACHINERY.

51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78

Fill in your name and address on other side of this blank.

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on pages 886-887 mark with X in the squares below, the identifying number found at end of each description on pages 886-887 — or write directly to the manufacturer mentioning name of material as described in August MACHINERY.

201	202	203	204

Fill in your name and address on other side of this blank.

Detach and mail to MACHINERY, 148 Lafayette St., New York, N. Y.

[SEE OTHER SIDE]

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Michigan High-Production Gear Finisher

A heavy-duty gear finisher with complete hydraulic operation has been added to the line of the Michigan Tool Co., 7171 E. McNichols Road, Detroit, Mich. This machine embodies the same basic principle of operation as the No. 854 rack type gear finisher built by the concern in that a gear is finished by means of serrated cutters of a reciprocating horizontal rack with which the gear is meshed. The relation between the gear axis and the cutters is such (crossed axes) as to provide a diagonal relative motion of the gear teeth across the serrations in the rack blades at the same time that the rack is rolling the gear.

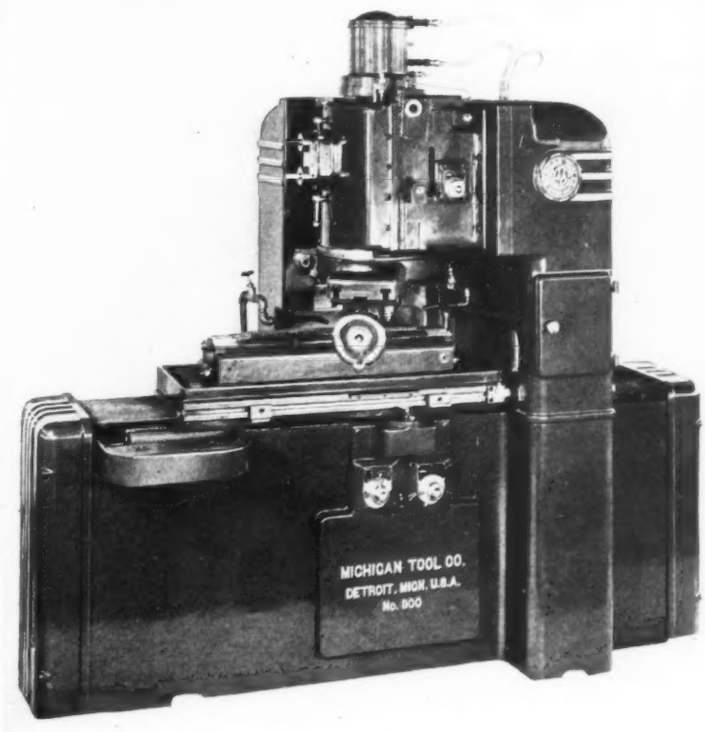
In addition to the hydraulic operation of the rack table, a feature that has been supplied on previous machines to insure smooth operation and a cushioned reversal of the stroke, both the cross-feed of the head and the down feed of the gear are actuated hydraulically. The cross-feed is designed to reciprocate the gear across the rack at a constant speed which is adjustable. The length of the stroke across the rack and the transverse portion of the rack over which the gear is reciprocated are also quickly adjustable. Simplified set-up, improved gear finish, and even distribution of rack wear are advantages of this cross-feed.

The hydraulic down-feed mechanism provides a rapid approach and a slow cutting feed that is adjustable from 0.0005 to 0.0025 inch per cycle of the table. This is accomplished through a single valve. The down feed is automatically stopped when the gear reaches the required size. A dial setting is provided for automatically stopping the rack after the desired number of finishing strokes. The head then automatically rises at the rapid return rate to clear the gear for unloading. The effective length of stroke is more than 3 inches greater than on the No. 854 machine.

One of the construction features is the location of the head gibs directly over the center of the gear being finished, so as to eliminate any weaving tendency. The cross-rail or bridge is made as a single casting to obtain maximum rigidity. The headstock and tailstock are fastened to the hardened and ground ways by means of four bolts, thus eliminating the necessity of using gibs for clamping them and insuring a solid anchorage.

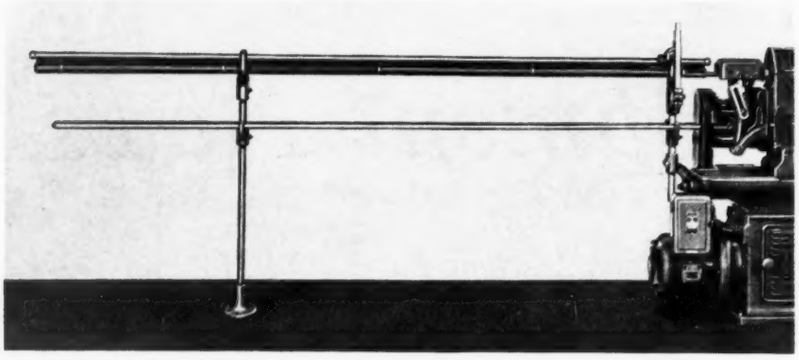
The new machine is designed to finish gears up to 8 inches in diameter with a maximum length of 18 1/2 inches between centers. It is provided with a central lubrication system which automatically oils all vital parts of the machine each time that a gear is finished. There is also a new coolant system which is said to improve the quality of finish and increase the tool life materially.

The coolant system includes a combination reservoir and cleaning tank having six separate compartments in series with each other and provided with individual drain pipes. The coolant flows through a strainer into the first compartment and then over baffles into the consecutive compartments for progressive deposition of foreign matter. The fifth compartment is filled with steel wool for a final filtering. 51



Michigan Gear Finisher Designed for Hydraulic Reciprocation of the Table, Cross-feed of the Head, and Down Feed of the Gear

To obtain additional information on equipment described on this page, see lower part of page 890.



Brown & Sharpe Screw Machine Stock Support Designed to Eliminate Noise

Silent Stock Support for Wire-Feed Screw Machines

Elimination of the noise produced by the rotation of stock is the advantage claimed by the Brown & Sharpe Mfg. Co., Providence, R. I., for a new stock support brought out for use in place of the support regularly furnished with B & S wire-feed screw machines. In this new support, the stock rotates in a flexible metal guide which is open at both ends and supported in a non-metallic casing. The construction deadens sound and prevents the transfer of vibration.

A grease-gun connection facilitates occasional lubrication of the inside of the flexible guide. The casing is free to slide in the outer support bracket and is secured to the inner support bracket by a simple swing latch which prevents creeping during the operation of the machine.

A new bar of stock is inserted in the machine end of the silent stock support by transferring the inner support bracket to the loading position stud, this stud having a vertical adjustment to insure that the bar will clear the machine. With the bracket back in the operating position, the bar stock is easily inserted in the machine spindle. The new support is made in four sizes. 52

Lincoln Hard Surfacing Powder

A fine-grained alloyed powder known as "Surfaceweld A" has been produced by the Lincoln Electric Co., 12,818 Coit Road, Cleveland, Ohio, for application to metal with the carbon arc, in order to obtain a smooth, dense, and hard surface. This powder will give a coating with a hardness of approximately Rockwell 54 C, the hardness depending somewhat upon the amount of admixture of the powder with the base metal. It is pointed out, however, that hardness has little relation to abrasion resistance, and this property of the hard coating is unusually good.

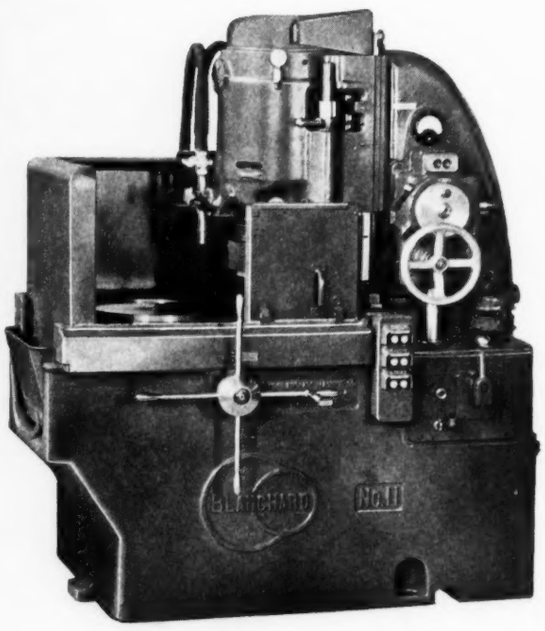
Full hardness is developed in the "as deposited" condition. The hardness is maintained and scaling resisted at high temperatures. The deposit cannot be softened by annealing. Under many conditions, the corrosion resistance compares favorably with that of stainless steel.

Very thin and unusually smooth layers of hardened metal can be obtained by using this powder. A deposit as thin as 0.025 inch can be applied to light metal, such as No. 12 to 20 gage. 53

Blanchard Surface Grinder of New Design

The Blanchard Machine Co., 64 State St., Cambridge, Mass., has designed a new small surface grinder, the No. 11, to supersede the No. 10 machine. The new grinder considerably surpasses the former in capacity, power, rigidity, and production. It is equipped with a larger wheel that operates at a lower speed, resulting in faster and cooler grinding, with less wheel wear. Special attention has been given to ease and speed of handling, and all controls are placed for quick operation.

The grinding wheel is 11 inches outside diameter, 9 inches inside diameter, and 5 inches deep. It is driven by a 15-H.P. induction motor located on the wheel-spindle. Work up to 20 inches in diameter by 8 inches high can be ground under the new wheel.

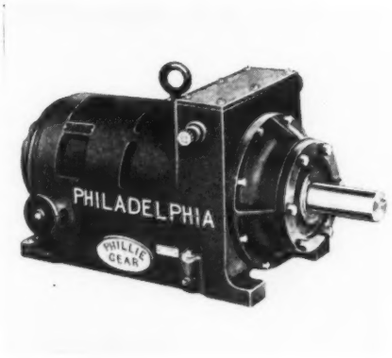


Blanchard No. 11 Surface Grinder Designed to Supersede the No. 10

The machine is driven by four motors, each of which is directly coupled to its load. One of these motors provides for rapid raising and lowering of the wheel-head by power through a push-button control. An improved feed-gear box provides for easy and sensitive hand feeding as well as power feeding at rates ranging from 0.004 to 0.070 inch per minute.

The base of the machine serves as a tank for the coolant, having a capacity of over 75 gallons. In an extension of the tank at the rear is a motor-driven centrifugal pump for supplying water to the inside of the wheel and to an outside nozzle. The No. 11 grinder has an over-all length of 5 feet 3 inches, and a width of 3 feet 6 inches. 54

To obtain additional information on equipment described on this page, see lower part of page 890.



"PlaneTorque MotoReduceR" which Stops Automatically when Overloaded

Philadelphia "PlaneTorque MotoReduceR"

A motor drive designed to insure protection for any equipment that may jam or become overloaded, such as conveyors, agitators, and mixers, has been placed on the market by the Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa. In case the load exceeds a predetermined amount, the motor is instantly shut off. As soon as the excessive load is removed, the motor is ready to be started again without resetting.

This motor drive operates in the following manner: Whenever excessive torque is imposed on the output shaft, the increased torque required to rotate the planet gears mounted on the output shaft spider transmits a higher torque to the internal gear, which is held in its normal position by a lug and heavy spring. When the torque on the internal gear exceeds a predetermined value, the spring is compressed. This causes the lug to actuate a switch at the top of the unit and disconnect the power. The motor drive can be furnished for clockwise or counter-clockwise rotation or for both. 55

Honing Machine of New Design

A honing machine that differs from conventional design is being introduced on the market by the Honing Equipment Corporation, 4612 Woodward Ave., Detroit, Mich. This machine is built with a flat worktable on which any kind of fixture can be placed for holding the workpieces. The operator has a clear view of the work at all times. By the provision of a suitable fixture, the work can be gaged without removal from the fixture. The illustration shows a small part being honed.

The honing spindle operates vertically through the table. Speed changes for the reciprocation and rotation of the spindle are made independently through knob controls. Any reciprocating speed from 700 to 1000 cycles per minute is available, and any speed of rotation from 0.9 to 27 R.P.M. Bores up to 2 inches in diameter can be honed.

The electrical control switch is provided with start, stop, and "inch" buttons. In addition, there is a foot-pedal for instantly stopping the spindle without stopping the motor; however, the machine cannot be started by the foot-pedal. 56

All-Steel Welded Bench for South Bend Lathes

The all-steel welded bench here illustrated has been developed by the South Bend Lathe Works, 777 E. Madison St., South Bend, Ind., to provide a suitable support for the bench lathes manufactured by that concern. The smooth flowing lines and rounded corners of this bench show a modernistic trend toward streamline shop equipment that is not only pleasing to the eye, but also practical. There are no sharp corners in which dirt or chips can collect and no angular projections to form a hazard to the workmen.

Around the top of the bench is a deep rolled rim which serves as a chip- or oil-pan. The sides and back of the bench are enclosed in panels that are welded to the framework, while the front is open to enable the operator to assume a comfortable working position.

New Type of Honing Machine Brought out by the Honing Equipment Corporation

All-steel Bench for Lathes Manufactured by the South Bend Lathe Works

To obtain additional information on equipment described on this page, see lower part of page 890.

Fig. 1. Using "Ultra-Chex" Precision Measuring Standards to Check a Micrometer

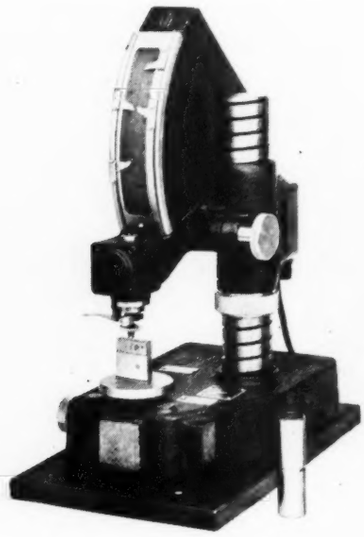


Fig. 2. Setting a Comparator with "Ultra-Chex" Blocks

The motor drive is located at the left-hand side. Each of the three drawers on the right-hand side has an individual tumbler lock, combined with a latch and knob. 57

Lake Erie Air-Operated Drop Stamps

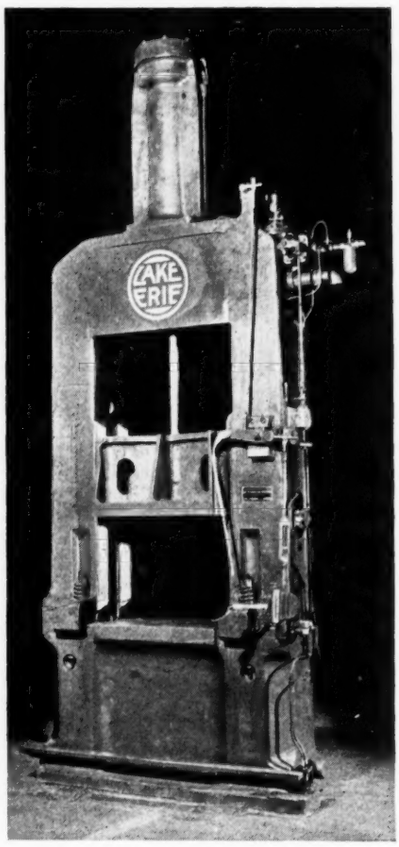
A complete line of high-speed air-operated drop stamps has been brought out by the Lake Erie Engineering Corporation, Buffalo, N. Y., for many applications in the general sheet-metal working field, as well as in airplane manufacturing and other specialized plants. These machines are particularly suitable for long- and short-run stamping, forming, and embossing of standard alloys, as well as of alloys difficult to form because of low ductility, and thin quick-cooling hot work.

The machines are completely self-contained, being ready for connection to compressed air lines. A hand-lever gives a sensitive control of the operating speed and the power applied. There is an adjustable cam setting for obtaining a positive or oscillating motion.

Dogs hold the ram in two upper positions, insuring safety of operation. The ram cannot be operated until these dogs are pulled clear by air cylinders, which are operated through a foot-treadle. Over-travel of the ram from any cause is prevented by an air cushion on top of the cylinder. The cast-steel ram is of such shape and cross-section as to withstand operating impacts, and the anvil is a tough alloy iron. 58

Precision Length Standards of Moderate Price for Small Shops

A set of "Ultra-Chex" precision measuring standards that are accurate within eight millionths of an inch is being placed on the market by the George Scherr Co., Inc., 128 Lafayette St., New York City, at a price so moderate as to bring it within the reach of the smallest shop. The nine standards included in the set can be made into seventy-one combinations, in steps of 1/16 inch up to 4 7/16 inches, and forty-one combinations, in steps of 0.100 inch up to 4.1 inches. The individual standards measure 0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, and 2 inches in thickness.



Lake Erie Drop Stamp for Quick Forming of Sheet-metal Parts

These standards are intended to enable even the smallest shops to be equipped with means of interchangeable manufacture, as they provide for the accurate checking of micrometers; toolmaker's microscopes; height, snap, depth, and other gages; vernier calipers; indicators; and other devices upon which production accuracy depends. They have a hardness of 68 Rockwell C.

The use of one of the length standards for checking a micrometer is illustrated in Fig. 1, the remainder of the set being seen at the rear left-hand corner of the surface plate, together with an optical flat which may or may not be furnished, as desired by the customer. Fig. 2 shows two length standards being used for setting a comparator.

The optical parallel or flat is flat within four millionths inch. It is intended for such work as checking the parallelism of micrometer anvils by observing the light interference bands on both anvils. 59

To obtain additional information on equipment described on this page, see lower part of page 890.

Westinghouse Lighting Equipment

A fluorescent lighting unit intended for general or supplementary industrial lighting applications when an efficient, low brightness or extended source of light is required has been developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This unit is available in both single- and two-lamp types for either 110- to 120- or 220- to 440-volt lines. A steel housing completely encloses the reflectors, sockets, and controls. The reflecting surface has a mirror finish for the concentrating type, two-lamp unit, and a diffused finish for the spread type, single-lamp unit.

This company has also brought out a line of high-bay lighting units which have the "Locklite" feature. These aluminum reflector units are designed for use with incandescent lamps for general lighting of high-bay areas in foundries, machine shops, power plants, receiving and shipping departments, sheet-metal works, etc. The "Locklite" principle of attaching the reflectors is designed to speed installation, reduce maintenance costs, and provide increased safety, together with interchangeability of the different reflector units.

Each unit consists of a hood and a receptacle into which the reflector with the lamp-holder fits. The electrical connection is made when the lugs on the neck of the reflector lock into the slots in the hood. This is accomplished by giving the reflector a clockwise turn of 60 degrees. 60

"Smooth-Line" H-P-M Fastraverse Double-Action Drawing Press

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has brought out another "Smooth-Line" Fastraverse double-action platen press for the sheet-metal working industry, this press having a maximum capacity of 500 tons. The new press has two separate hydraulic pressing members, the main slide and the die cushion platen underneath the bolster plate. The pressing area of the main slide is 72 by 60 inches, and that of the die cushion slide is 59 by 32 inches.

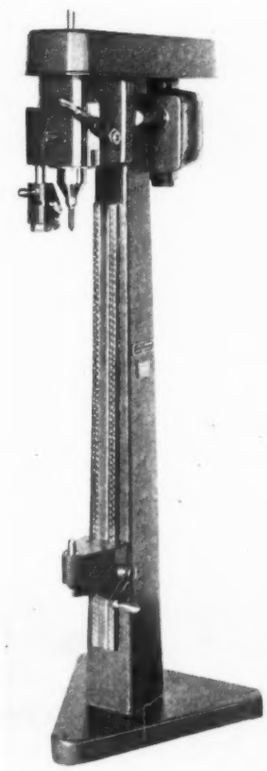
The main slide is actuated by a double-acting piston type ram that operates in a smooth-bored steel cylinder. Directly connected to the main cylinder, without operating valves, is a "Hydro-Power" radial pump. The main ram movement is controlled by regulating the pump output, which is both variable and reversible. The press is operated rapidly and without shock by the application of the H-P-M closed circuit, and a fast closing and opening speed is obtained through the Fastraverse system. 62

Improved Ex-Cell-O Center-Lapping Machine

Female centers in work to be held between centers for cylindrical grinding operations can be quickly and economically lapped on the improved lapping machine brought out by the Ex-Cell-O Corporation, 1212 Oakman Blvd., Detroit, Mich. The true, smooth centers produced by lapping facilitate grinding the work straight and round and with a good finish.

The work in which centers are to be lapped is placed on the vertically adjustable work-rest and held by hand while a lapping stone mounted in the machine spindle is fed down by a hand-lever. The work-rest is held in place by a cam and is locked in position by a hand-crank. The lapping stone is mounted on an Ex-Cell-O precision ball-bearing spindle, which is connected by an arm to a counterweight in the column to permit sensitive control over the lapping pressure.

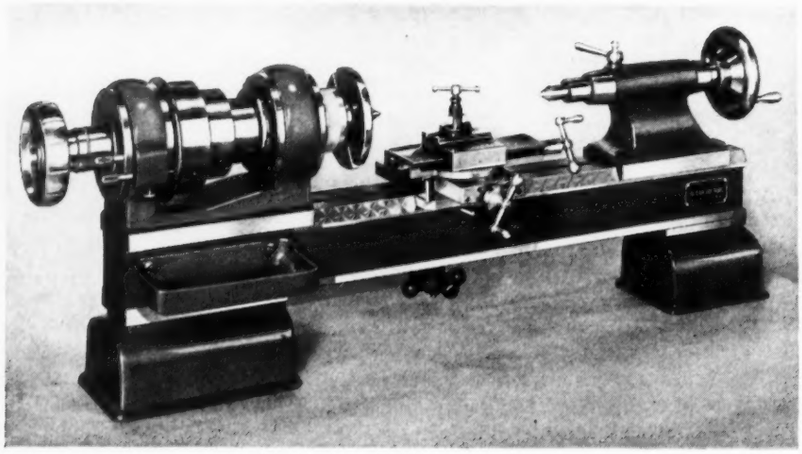
Four-step pulleys on the spindle and electric driving motor provide lapping speeds of 700, 1300, 2500, and 4650 R.P.M. The machine will lap centers up to 15/16 inch in diameter in work up to 10 inches in diameter by 36 inches long. With a special column, work up to 84 inches in length can be lapped. The lapping-stone dresser can be easily swung in or out of the dressing position. The diamond is passed across the stone at a 60-degree angle by means of a rack and pinion. The dresser can be readily adjusted to compensate for wear on the lapping stone. 61



Ex-Cell-O Center-lapping Machine

H-P-M Fastraverse Double-action Drawing Press of 500 Tons Capacity

To obtain additional information on equipment described on this page, see lower part of page 890.



New Bench Lathe Built by Elgin Tool Works

Elgin Precision Bench Lathe

The Elgin Tool Works, Berteau and Ravenswood Ave., Chicago, Ill., has placed on the market a precision bench lathe of the design here illustrated. This bench lathe is equipped with a preloaded ball-bearing spindle. The headstock is fitted with "Super Perfex" bearings. The spindle is hardened throughout, and is ground internally and externally, including the threads.

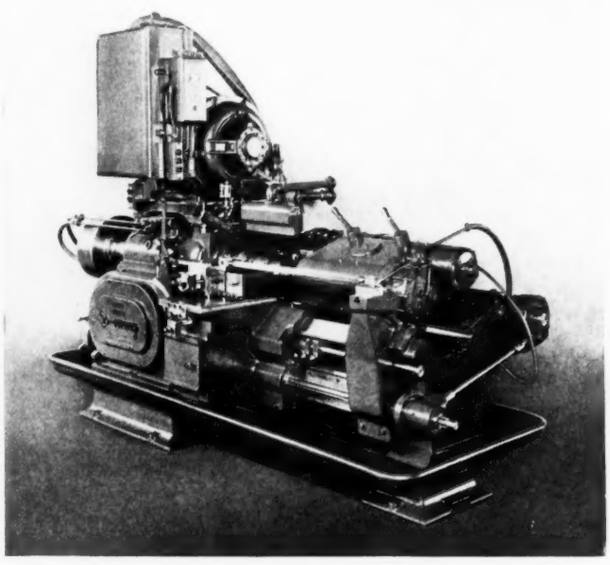
The slide-rest is equipped with dials graduated to 0.001 inch. The top slide swivels 360 degrees to enable the operator to cut to any angle or taper. Locks for the top slide are provided 180 degrees apart. The tailstock handle also has a large dial graduated to 0.001 inch.

This lathe is built in three collet capacities—1/2, 3/4, and 1 inch. The 1/2-inch size is available with a swing of 7 inches, and the 3/4- and 1-inch sizes with a swing of 7 or 9 inches. All sizes are built to take a full line of attachments. 63

Heavier Model of Lo-Swing Lathe

A heavier Model R Lo-Swing lathe, which has been designated Model R-14, is being placed on the market by the Seneca Falls Machine Co., Seneca Falls, N. Y. This new machine is a fully automatic lathe equipped with the Seneca Falls all-mechanical quick change-over mechanism which makes it possible to change the stroke by merely setting a graduated dial. The machine handles heavy multiple-tool turning work ranging from 10 to 11 inches in diameter and up to 36 inches in length between centers.

The design and construction features of previous Lo-Swing lathes are incorporated in the Model R-14. It can be provided with an overhead third arm. The machine illustrated is equipped with a special motor-driven tailstock to provide long travel. This machine weighs slightly over 7 tons with average equipment. 64



Lo-Swing Lathe Equipped with a Motor-driven Tailstock for Long Travel

Chromium-Plated Pneumatic and Hydraulic Cylinders

The inside of the tubing bodies of the non-rotating cylinders made by the Tomkins-Johnson Co., Jackson, Mich., for use with compressed air or with water under pressure is now being hard chromium-plated. The bodies are first honed and then a layer of chromium approximately 0.001 inch thick is applied to the inside of the tube.

This practice results in a very smooth polished surface that will not rust. In fact, moisture from the condensation of compressed air or water acts as a lubricant for the chromium-plated body and increases the "slickness" of the surface. This reduces friction, prolongs packing life, and increases the efficiency of the cylinder. The piston-rod is also chromium-plated to obtain the same smooth lubricated action in passing through the packing. 65

Additional Sizes of Colonial "Junior" Broaching Presses

Five basic models built in four capacity ranges with three lengths of stroke now make up the line of "Junior" hydraulic broaching and assembling presses which was started by the Colonial Broach Co., Detroit, Mich., with the development of the 1/2-ton hydraulic press illustrated in June MACHINERY, page 722. The line includes a 1/4-ton press with a 9-inch stroke, the previously announced 1/2-ton model which has a 12-inch stroke, 1-ton models with 12- and 18-inch strokes, and a 2-ton model with an 18-inch stroke.

The different models are similar in construction, differing mainly in dimensions. A self-contained operating system includes a constant-delivery pump of 1000-pound pressure capacity which is submerged in an oil reservoir in the base of the column. The pump is direct-driven through flexible couplings by an electric motor mounted vertically within the column. The ram is controlled through a four-way valve which is operated either

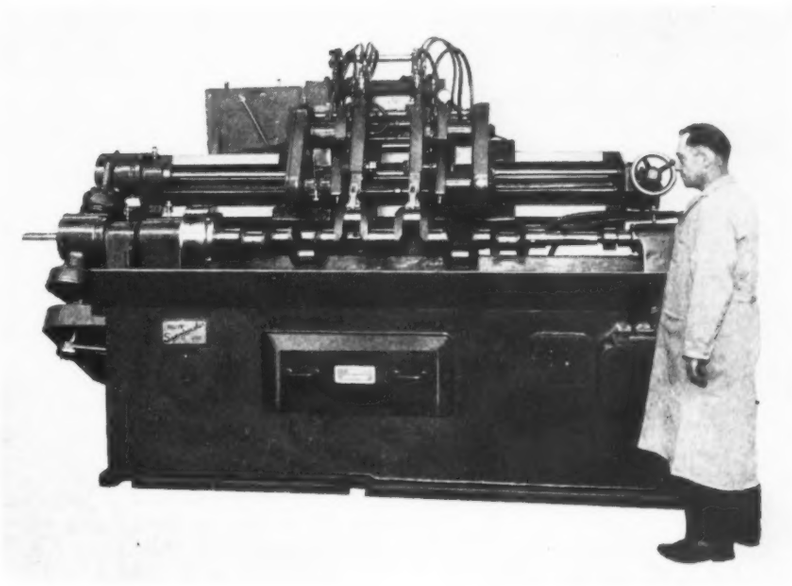
To obtain additional information on equipment described on this page, see lower part of page 890.

manually by a single lever or automatically by the ram and adjustable stops. These presses take up a bench space ranging from 12 by 20 inches for the 1/4-ton model up to 15 by 25 inches for the 2-ton model. 66

Foster Superfinishers for Tractor Crankshafts

Superfinishing machines for finishing the pin and main bearings of large tractor crankshafts have recently been built by the Foster Machine Co., Elkhart, Ind. The illustration shows the machine for superfinishing the pin bearings. Both machines are of a universal design, being adjustable to suit crankshafts of various lengths.

The superfinishing heads operate simultaneously. In the case of the pin bearing machine, the heads are adjustable to accommodate different throws of crankshafts, and are also adjustable in a lateral direction. The heads are oscillated by fluid motors. The machine cycle is fully automatic. Bearings with a finish of from 2 to 3 micro-inches are obtained on a production basis. 67

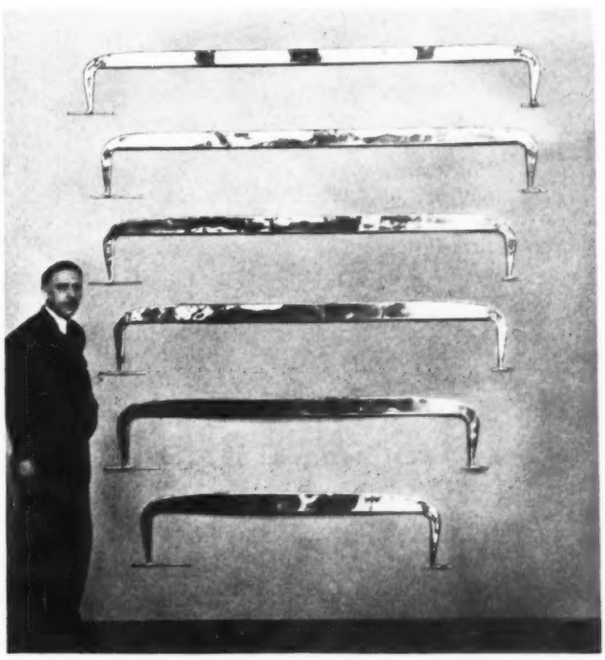


Foster Superfinisher Designed to Handle Various Sizes of Tractor Crankshafts

Davis Tubular Micrometers

Large-capacity micrometers made with frames of 20-gage cold-drawn steel, welded, normalized, and nickel-plated, are now being manufactured by the Davis & Thompson Co., 6619 W. Mitchell St., Milwaukee, Wis. These micrometers are available in the bar style shown and in a bow or crescent type. Drop-forgings are welded into the ends of the frame to hold a sliding ground bar at one end and a micrometer head at the opposite end. A dial indicator can be provided instead of the micrometer head to enable measurements within 0.0005 inch to be made.

The bow micrometers are regularly made in fifteen sizes, the smallest of which has a capacity of from 6 to 12 inches, and the largest from 90 to 96 inches. The bar micrometers are also made in fifteen sizes, the smallest having a capacity of from 18 to 24 inches, and the largest from 162 to 168 inches. The smaller sizes of the bar micrometers have a leg length of 8 inches, and the larger sizes, 9 inches. 68



Several Sizes of One Style of Large Tubular Micrometers Made by the Davis & Thompson Co.

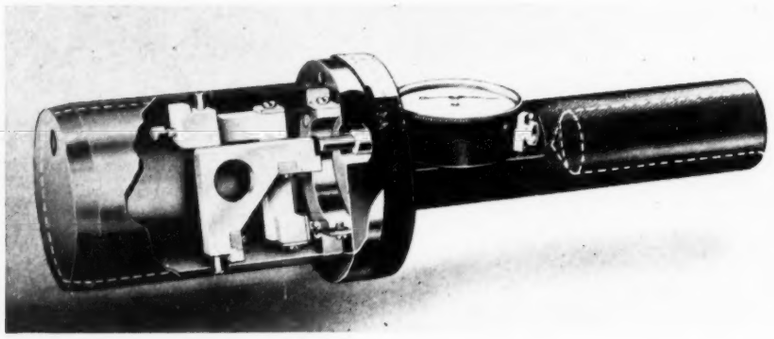
"Hardweld 50"—A Medium High-Carbon Electrode

A medium high-carbon electrode, known as "Hardweld 50" and intended for building up the surfaces of steel parts, is now being produced by the Lincoln Electric Co., 12,818 Coit Road, Cleveland, Ohio. The dipped coating of this electrode stabilizes the arc and thus permits the deposition of a tough, dense, medium-carbon steel. The deposit has considerable resistance to deformation and wear, and is machinable at a slow speed.

In general, when deposited on straight carbon steel and allowed to cool naturally, the hardness of the deposit will be from 20 to 35 Rockwell C, the exact hardness depending upon the rate of cooling and the analysis of the steel on which the electrode is deposited. The deposit may be hardened by the usual water quench from approximately 1500 degrees F. or by flame-hardening methods.

This electrode is intended for use in building up surfaces on such parts as shafts, axles, collars, flanges, locomotive and tractor parts, agricultural implements, and vise jaws. It can also be used for building up worn parts to size before applying hard-facing alloys. "Hardweld 50" can be used in vertical welding, but for best results the work should be fairly horizontal. 69

To obtain additional information on equipment described on this page, see lower part of page 890.



Sheffield Plug Gage with Diametrically Opposite Gaging Points Mounted on Reed Mechanism

Sheffield Indicator Type Plug Gage

The reed mechanism used in the "Visual Gages" made by the Sheffield Gage Corporation, Dayton, Ohio, has now been applied effectively in the construction of an indicator plug gage recently brought out by this company. The new plug gage is intended primarily for checking cylindrical bores during the finishing operation, while the work is still set up on the machine, in order to determine the amount of material to be removed. However, the gage is equally useful for final inspection.

The patented reed mechanism incorporated in this gage carries two gaging points that are diametrically opposite each other. With this arrangement, any irregularity on either side of the bore is instantly indicated on the dial. The construction is such that the effects of thrust pressure between the part and the gage are minimized. One of the advantages of this gage is that a bore can be checked at a point beyond the pilot sleeve, where the diameter may be as much as 0.010 inch smaller than the bore itself. 70

Self-Contained Grinders for Application to Other Machine Tools

Self-contained grinders that can be adapted for both internal and external grinding by means of interchangeable spindle units are being placed on the market by the Standard Electrical Tool Co., 1948 W. 8th St., Cincinnati, Ohio, for application to lathes, planers, milling machines, boring mills, etc. These grinders are available in sizes ranging from 1/4 to 10 H.P. Power is transmitted from the motor to the grinding spindle by means of a belt drive, thus maintaining the correct peripheral speed of the grinding wheel. The wheel overhangs the front of the unit, so as not to interfere with the work. A vertical hand adjusting screw raises or lowers the spindle assembly for grinding on centers.

Internal and External Grinder Built by the Standard Electrical Tool Co.

Either an open or an enclosed type of internal spindle assembly can be furnished, the two types being interchangeable and available in various lengths to meet diversified requirements. Changes from external to internal grinding can be made quickly, as the spindle assembly can be removed from the housing as a unit by loosening two clamp screws. A dowel insures accurate location of the spindle. 71

Westinghouse De-Ion Motor "Watchman"

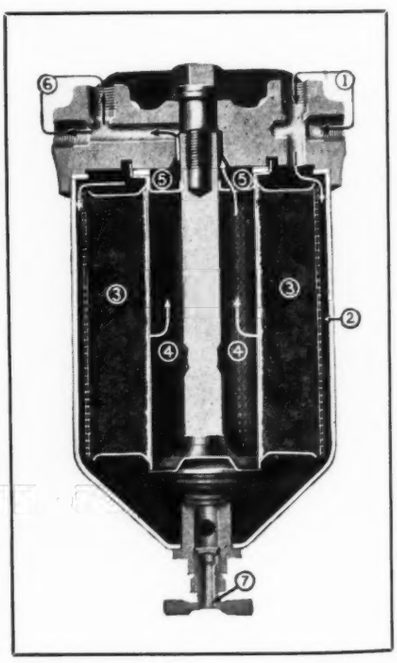
The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has brought out a De-Ion motor "Watchman," manually operated, across-the-line starter for controlling grinding wheels, drilling machines, fans, pumps, blowers, riveting and stapling machines, and other equipment driven by electric motors. A small size of this starter is applicable to motors up to 2 H.P., while a large size can be used for motors up to 7 1/2 H.P.

Positive indication of "on," "off," or "tripped" positions is provided by an indicating toggle switch that is recessed within the cover, so as to prevent accidental operation. A snap-action bimetal disk gives accurate overload protection and automatically disconnects the motor from the line before heat can damage the windings. A safety interlock prevents contact with live parts. 72

Oil Filter for Protecting the Bearings of Machine Tools

An oil filter designed for protecting the bearings of grinding machines, automatic screw machines, and other machine tools has been developed by the AC Spark Plug Division of the General Motors Corporation, Flint, Mich. This filter, which is known as the Type T-1, is easily installed. It removes all solid impurities, such as fine metal chips, from the oil.

The unfiltered oil enters the filter through one of the inlets 1 and flows downward through passages 2 into the drawn-steel case. It is then forced through the Igneonite filter element at 3 and passes into the brass collector tube 4. The clean oil



Oil Filter Design for Protecting the Bearings of Machine Tools

To obtain additional information on equipment described on this page, see lower part of page 890.

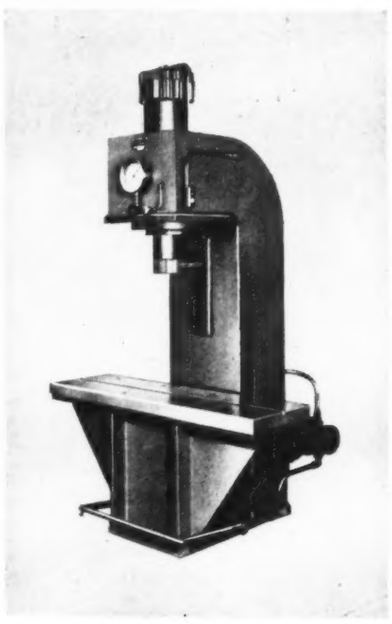
passes out through openings 5 and 6. Drain-cock 7 provides for the removal of accumulated dirt and water in the sump. 73

Denison 25-Ton Hydraulic Press

A 25-ton hydraulic press intended for straightening, assembling, and broaching operations has recently been developed by the Denison Engineering Co., Chestnut and Water Sts., Columbus, Ohio. The power unit of this press is mounted as an integral part of the fabricated steel frame. It consists of a 15-H.P. motor and hydraulic pumps that effect a down speed of the ram at the rate of 24 inches per minute. A pressure of 25 tons can be applied at any point in the complete length of the stroke, which is 18 inches.

The control mechanism consists of a reversing four-way operating valve, connected by linkage to a pressure control valve. The latter is operated through the lever at the front of the press. The motor control push-button is located on the side of the press frame.

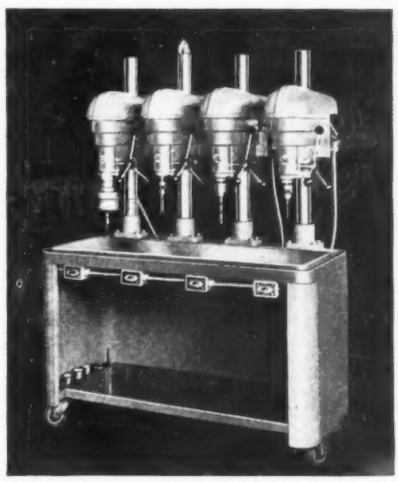
Full control of operation is maintained through a bar type foot-pedal. Infinite tonnage variations up to the capacity of the press can be attained by simply applying different pressures on the pedal. Reversal of the press ram can be effected at any point by releasing the pedal; the ram will then rise at the rate of 48 inches per minute. The length of the reversal stroke can be controlled by an adjustable stop which also acts as an unloading valve control. At the top of the reverse stroke, the pumps release oil to the reservoir at zero pressure, thus effecting a large saving in electrical energy. 74



Denison Straightening, Assembling, and Broaching Press

Boice-Crane Four-Spindle Portable Drilling and Tapping Machine

A four-spindle drilling and tapping machine provided with a base that can be furnished with swivel casters, as shown, to make it portable, has been placed on the market by the Boice-Crane Co., 1730 Norwood Ave., Toledo, Ohio. This machine is intended for high-speed drilling, reaming, and tapping. The four columns, which are of the Helmet-Head design, are located on 12-inch centers.

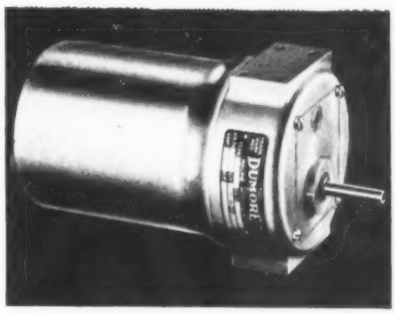


Portable Four-spindle Machine Built by the Boice-Crane Co.

The equipment includes either high-speed or low-speed motors of from 1/3 to 3/4 H.P.; counterweighted heads that permit quick-position changes; 1/2- or 5/8-inch chucks; and 1/4- and 1/2-inch high-speed quick-reversing tapping heads. Single- and two-spindle models, with or without casters on the floor bases, are also available, as well as bench type machines. 75

Dumore Aircraft Motor

A small-capacity motor designed to meet the requirements of aircraft applications has been placed on the market by the Dumore Co., Racine, Wis. This Type El-Y aircraft motor, as it is designated, has a rating of from 1/20 to 1/16 H.P. and a speed range of 200 to 1200 R.P.M. The weight is only 3 pounds.

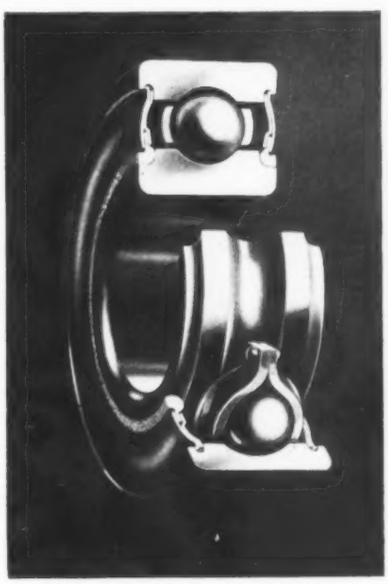


Dumore Small-capacity Motor Designed for Aircraft Applications

This motor is designed for operation on either 12- or 24-volt current, but it can be wound for 115-volt current when an in-line drive is required. Spur gears are employed in the drive. In addition to aircraft applications, the motor is suitable for use in automotive and nautical fields. 76

SKF Double Felt-Sealed Bearings of Single-Row Widths

A line of sealed ball bearings in which the seal is so designed that the bearings have the standard single-row S A E bore dimension and inner and outer race widths has been

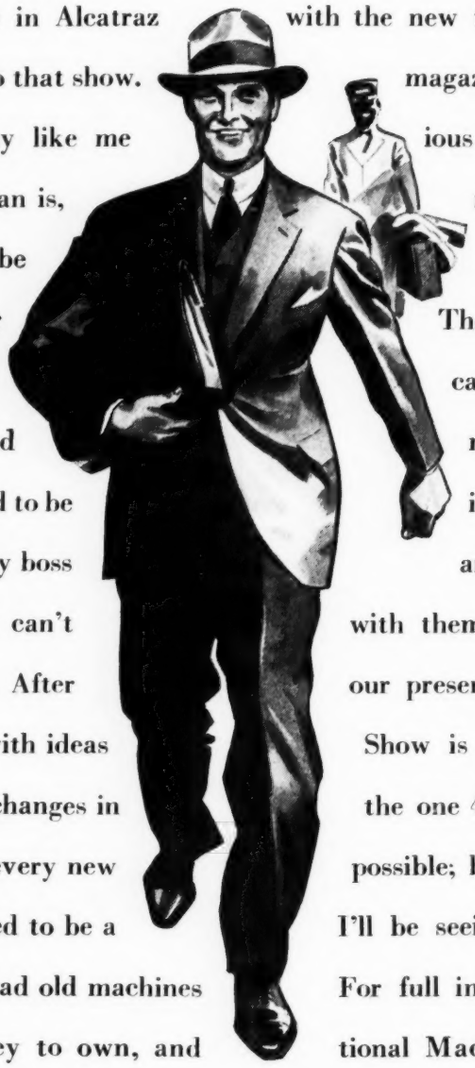


S K F Ball Bearing with New Type of Felt Seal

To obtain additional information on equipment described on this page, see lower part of page 890.

You couldn't keep me away from it!

"AM I going to the Machine Tool Show? Why, listen, if they had me in Alcatraz I'd get away somehow to go to that show. That's something that a guy like me simply has to do. What I mean is, among production men there'll be just two kinds of people after October 13—those who went to the Machine Tool Show and those who didn't. I can't afford to be one of the second kind. And my boss is smart enough to know he can't afford to have me miss it. After the 1935 Show I came back with ideas that resulted in a number of changes in equipment. And believe me, every new machine tool we bought proved to be a wonderful investment. We had old machines that were costing us money to own, and the Machine Tool Show gave us just the information we needed to have. I try to keep up with the new things as they come out in the magazines and literature from the various machine tool builders, but there's nothing like seeing the machine itself and watching it operate. There at the Show in Cleveland I can see them all — every kind of machine tool with the very latest improvements — under one roof; and all the newest gadgets to go with them—a lot of them adaptable to our present equipment. I hear this year's Show is going to be even better than the one 4 years ago! That sounds hardly possible; but I'm not taking any chances. I'll be seeing you in Cleveland. . . . . ."



For full information, please address National Machine Tool Builders' Association, 10525 Carnegie Avenue, Cleveland, Ohio.

MACHINE TOOL SHOW OF 1939

CLEVELAND • OCTOBER 4TH TO 13TH

YOUR SMARTEST INVESTMENT TODAY . . . MODERN MACHINE TOOLS

brought out by S K F Industries, Inc., Philadelphia, Pa. Sealing against dirt is effected in these bearings by a felt fiber contact on the polished surfaces of the inner race and by the utilization of the natural tendency of deflected felt to resume its original flat shape. Extensive tests have proved that the new seal retains the bearing lubricant and prevents dust or dirt from entering the bearing itself, in spite of the fact that the sealing action is so light that the friction drag has been greatly reduced.

The new bearing, therefore, is suitable for use over a wide speed range. Ample lubricant space is provided, as will be seen from the illustration. This S K F Red Seal bearing is available for application to shafts up to approximately 1 inch in diameter. 77

Combination Bin, Rack, and Skid

An all-steel work container, known as the "Collapsi-Bin," which combines in a single unit three distinct types of work-handling equipment has been brought out by Mechanical Handling Systems, Inc., 4700 Nancy Ave., Detroit, Mich. This container serves as a bin, a rack, and a skid. It is so designed that it can be used as a shipping container, as well as for interdepartment transit or for storage purposes, thus eliminating duplicate handling, crating, etc. The new work container is of heavy-duty construction and has a capacity of 8000 pounds.

When used as shipping containers, these bins can be stacked on top of each other to save space by using nesting plugs which slip into the tops of each corner post and into the legs of the unit immediately above. The fact that the side and end panels can be slipped out and nested flat on top of the skid when the bin is being returned empty saves two-thirds of the shipping space normally required.

Standard size units are approximately 3 feet wide by 5 feet long. The 40-inch height provides for a bin depth of well over 2 feet. The height to the top of the baseplate when the panels are removed is 14 inches. 78

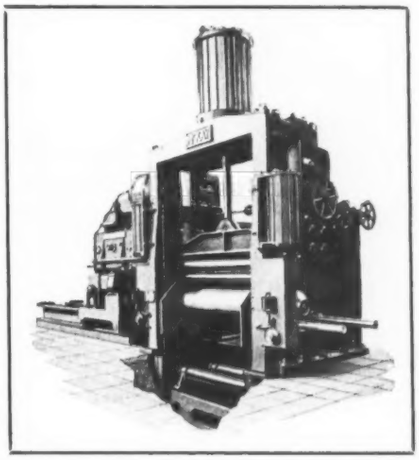
* * *

Handy Tool for Removing Chips from Machine Tool Slots

A handy tool for removing the metal chips from the table slots of planers, milling machines, and other machine tools is shown in the accompanying illustration. This tool is being distributed free by the Dayton Rogers Mfg. Co., 2830 S. 13th Ave., Minneapolis, Minn. It is die-cut from hard cold-rolled strip steel and is plated to prevent rusting. The handle is provided with a hole for hanging in the tool-crib or fastening to a chain that is attached to a machine tool.

* * *

There are more than fifteen hundred patented inventions incorporated in the modern automobile.

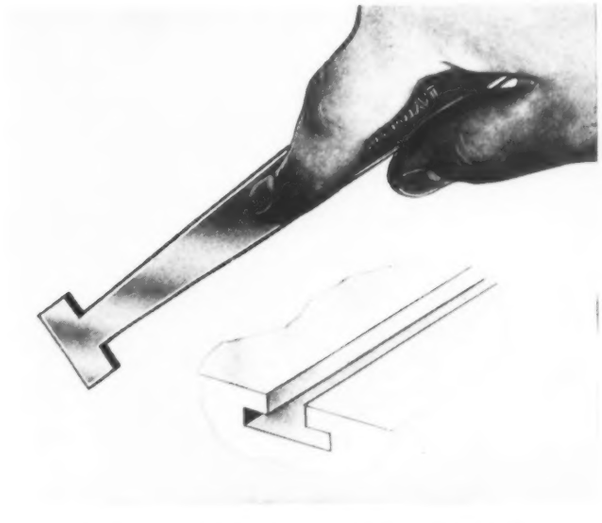


Large Steel Mill Machine Equipped with Heavy-duty Air Cylinders

Air Cylinders Applied to Large Steel Mill Machine

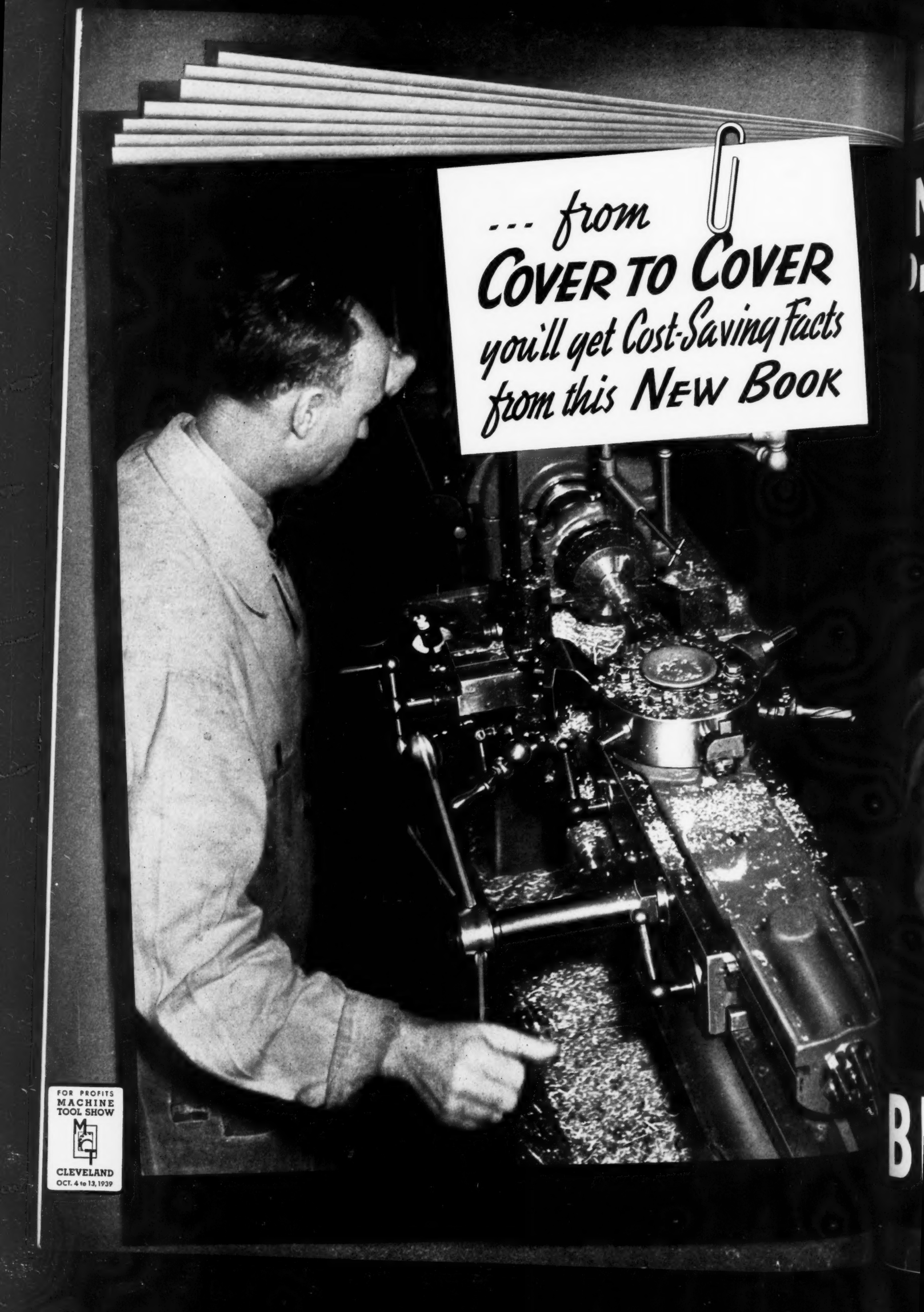
Heavy-duty air cylinders are incorporated in the large machine here illustrated, which is a processing uncoiler designed primarily for use in the cut-up and pickle lines of steel plants. The purpose of the machine is to unwind strips of steel from coils without the material tending to cross-break which is a characteristic in uncoiling hot-rolled steel by ordinary methods. The success of the machine depends upon the material being firmly held on a mandrel and drawn off under heavy tension. This function is controlled by heavy-duty air cylinders, as illustrated. The machine was built by the McKay Machine Co., Youngstown, Ohio, and the air cylinders were supplied by Logansport Machine, Inc., Logansport, Ind.

"Collapsi-Bin" which Serves as a Bin, a Rack, and a Skid



Chip Removal Tool Being Distributed by the Dayton Rogers Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 890.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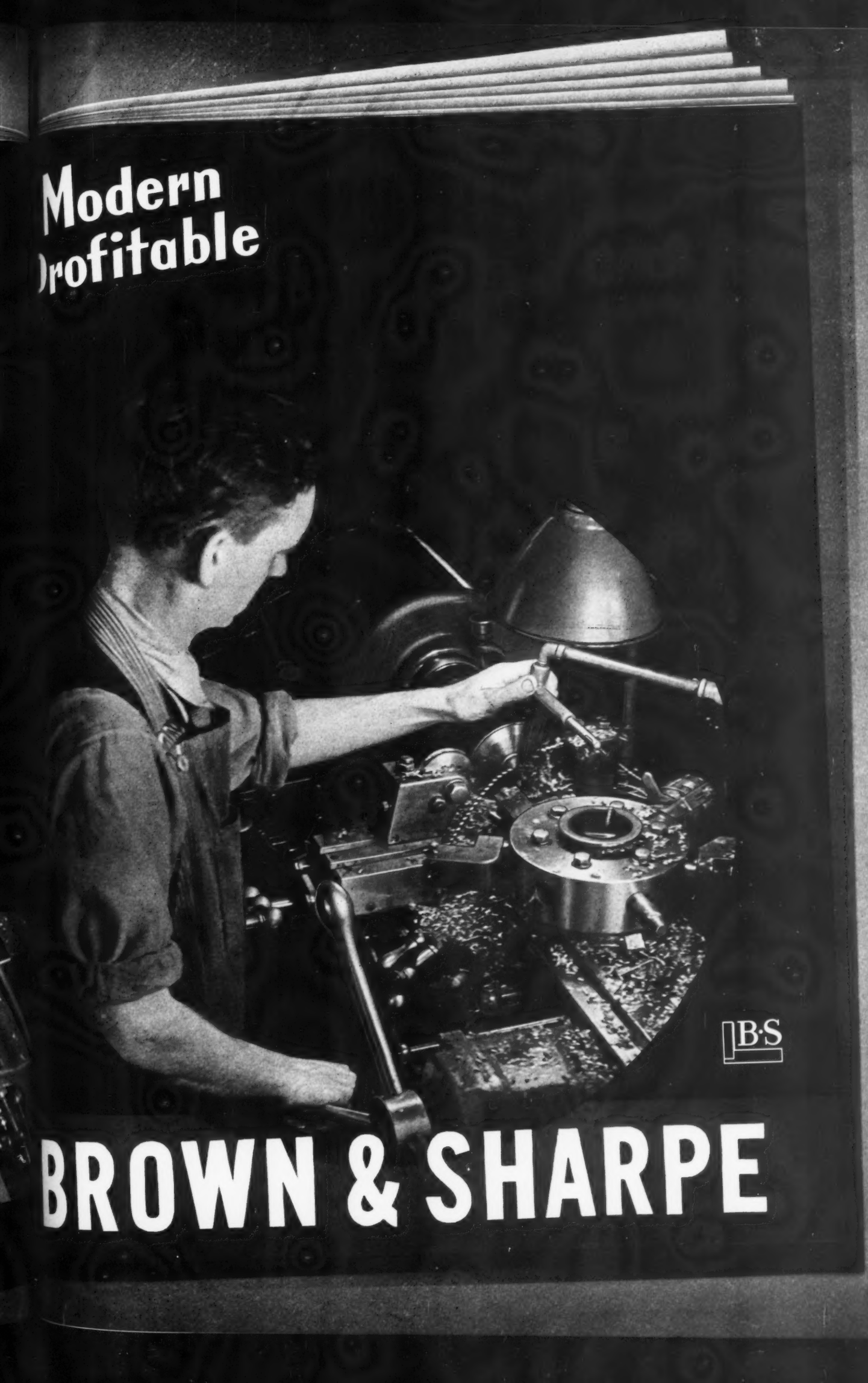
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NEWS OF THE INDUSTRY

California

DR. STEVEN P. TIMOSHENKO, for many years associated with the research staff of the Westinghouse Electric & Mfg. Co., and professor of mechanics at Stanford University since 1936, has been awarded the Lammé Medal for 1938 by the Society for the Promotion of Engineering Education. The Lammé Medal, founded to honor the memory of B. G. Lammé, who, at his death, was chief engineer of the Westinghouse Electric & Mfg. Co., is presented annually to an engineer in recognition of outstanding accomplishments.

WARREN H. MCBRYDE, consulting engineer, San Francisco, Calif., has been nominated president of the American Society of Mechanical Engineers for 1940. The election is by letter ballot of the entire membership, closing September 26.

Iowa and Colorado

THOMAS TRUCK & CASTER CO., 3890 K St., Keokuk, Iowa, has purchased the business of the WILLIAM H. SIPPEL CORPORATION, South Bend, Ind., manufacturer of truck casters, floor trucks, industrial trailers, and skid platforms. The Sippel products will be combined with the Thomas line of casters and trucks, and all production will be carried on in the Keokuk plant.

AJAX FLEXIBLE COUPLING CO., Westfield, N. Y., has appointed the URQUHART SERVICE CO., 1501 Wynkoop St., Denver, Colo., sales representative of the company in the Colorado district.

Illinois

AMERICAN MANGANESE STEEL DIVISION OF THE AMERICAN BRAKE SHOE & FOUNDRY CO., Chicago Heights, Ill., has recently expanded its main plant. The additions to the plant include a new administration building, an employes' welfare building, foundry addition, new pattern storage, machine shop addition, shipping-room addition, and new heating plant.

R. G. HASKINS CO., 615 S. California Ave., Chicago, Ill., is celebrating this year the company's twentieth anniversary. During the last twenty years, the business has had a steady growth. Less than a year ago, it became necessary for the company to move into much larger quarters provided by a new factory located at S. California Ave., Chicago.

THOMAS V. BROOKE has been appointed sales engineer at the Chicago office, 310 S. Michigan Ave., of the Lincoln Electric Railway Sales Co., Cleveland, Ohio. Mr. Brooke has been associated with the Lincoln Electric Co. for several years as research engineer.

PERFECTION TOOL & METAL HEAT TREATING CO., 1740 W. Hubbard St., Chicago, Ill., recently acquired the rights to the "Nusite" hardening process, and is now applying this process to the treatment of cobalt high-speed steel.

R. G. TABORS, formerly located in the Philadelphia office of the Baldwin-Southwark Corporation, has been transferred to Chicago, where he will head the sales activities of the Southwark Division of the corporation.

Maryland and North Carolina

KOPPERS CO., Koppers Bldg., Pittsburgh, Pa., has been granted the exclusive United States license for the manufacture and sale of Fast's multiple oil-film bearings. These bearings will be produced at the Bartlett Hayward Division of the company in Baltimore, Md., as a companion product to the Fast's self-aligning coupling that the company has been manufacturing for many years.

DIEHL MFG. CO., ELECTRICAL DIVISION OF THE SINGER MFG. CO., Elizabeth, N. J., has opened an office in the Johnston Bldg., Room 617, Charlotte, N. C., with JAMES H. LEWIS in charge.

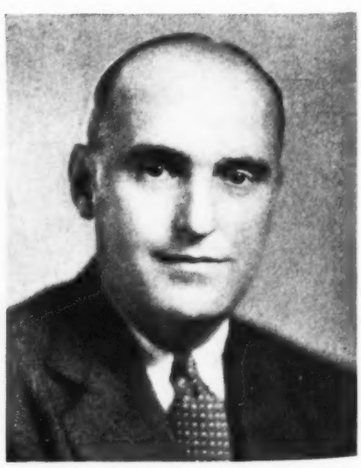
Michigan, Wisconsin, and Indiana

N. A. WOODWORTH, formerly president of the Ex-Cell-O Corporation, Detroit, Mich., has formed a new company under the name of N. A. WOODWORTH CO., located at 9111 Schaefer Highway, Detroit, Mich. Associated with Mr. Woodworth are E. W. LAMONTE, previously with the Swartz Tool Products Co., and J. F. BENNER, formerly of the Partool Machine Co. The N. A. Woodworth Co. has acquired the plant and facilities of the Partool Machine Co. The activities of the company in the beginning will be directed toward precision tool and machine work, as well as machine tool work.

E. W. SEEGER, formerly in charge of the production engineering department of Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee, Wis., manufacturer of motor control and allied electrical equipment, has been appointed manager of the development department. P. B. HARWOOD, who was Mr. Seeger's assistant in the production engineering department, has been made manager of the engineering department. Both Mr. Seeger and Mr.

E. W. Seeger, Recently Appointed Manager of Development Department of Cutler-Hammer, Inc.

P. B. Harwood, New Manager of the Engineering Department of the Cutler-Hammer Company



B. M. Horter, Newly Appointed General Sales Manager of the Organization

NEW BOOKS AND PUBLICATIONS

THE WELDING ENCYCLOPEDIA. 696 pages, 5 5/8 by 6 3/4 inches. Edited by L. B. Mackenzie and H. S. Card. Published by the Welding Engineer Publishing Co., 608 S. Dearborn St., Chicago, Ill. Price, $5.

This is the ninth edition of a welding encyclopedia which covers all the welding processes in commercial use. The book has been designed primarily to meet the needs of the practical man. Although considerable engineering data has been included, less emphasis has been placed on the purely technical and research aspects of the subject. The text has been completely re-edited by Stuart Plumley, much of the material being entirely rewritten. Since the publication of the eighth edition, more than six years ago, the welding industry has witnessed a number of major engineering developments which have been included in the new edition. Perhaps the greatest development is in the extended use of coated electrodes. The shielding of the arc with these electrodes accounts for the enormous development in arc welding during recent years. This method is fully described in the present edition.

A feature of the new edition is the arrangement of the subject matter in alphabetical order, so that the data can be referred to quickly without consulting an index. As in the previous editions, the present book includes a complete list of trade names.

STEELS FOR THE USER. By R. T. Rolfe. 280 pages, 5 1/2 by 8 1/2 inches; 90 illustrations. Published by the Chemical Publishing Co. of N. Y., Inc., 148 Lafayette St., New York City. Price, $8.50.

The author of this book is chief metallurgist of one of the leading steel manufacturing companies in Great Britain and has prepared this book specifically for the engineer and user of carbon steels. The book has been prepared from the practical point of view; mechanical tests are fully dealt with; requirements and specifications are critically discussed in the light of a large number of tests made in actual practice; compositions, heat-treatments, and similar information pertaining to steel are fully treated. Bright and free-cutting steels, a subject on which there is not a great deal of information available in text-books, have been amply dealt with. There are also chapters on casehardening and other special processes, on the use of steels at high temperatures, on torsion and fatigue testing, and on the general principles of the selection of steel for different purposes. Many examples of failures in service, because of the use of unsuitable materials, are referred to. A bibliography has been included to enable the reader to investigate more fully any subject in which he may be especially interested.

ELEMENTS OF MECHANISM. By Peter Schwamb, Allyne L. Merrill, and Walter H. James. 400 pages, 6 by 9 inches. Published by John Wiley & Sons, Inc., New York City. Price, $3.50.

This is the fifth revised edition of a work that for many years has been recognized as a standard text-book in its field. The revision has been carried out by Professor Walter H. James. The most important changes are (1) a more thorough discussion of the general laws of motion, with special attention to acceleration; (2) replacement of some of the older examples by others, based on present-day practice; (3) rearrangement of the order of the chapters in accordance with suggestions by a number of instructors who use the book in classroom work; and (4) placing all the problems which apply directly to a given chapter at the end of that chapter. The purpose of the book is to familiarize the student with the fundamental principles of kinematics as applied to mechanical movements. It has not been attempted to describe a large number of different devices, but rather to select the relatively more common and more elementary machine elements, and to study their motions when combined in certain definite ways.

STRENGTH OF MATERIALS. By Norman C. Riggs and Max M. Frocht. 432 pages, 6 by 9 inches; 454 illustrations. Published by the Ronald Press Co., New York City. Price, $3.75.

The authors of this book, who are, respectively, professor of mechanics and associate professor of mechanics at the Carnegie Institute of Technology, have designed this book not only to meet the requirements of a first course in the strength of materials, but also to provide a practical understanding of recent developments and research in this field. A great deal of new and important material that has not before appeared in text-books of this type has been included, so that the student may become familiar with modern developments and their applications to present-day industry. There is, for example, a chapter on photo-elasticity, a subject which gives the student a visual demonstration of theoretical results. There is also a complete set of curves giving the factors of stress concentration, and information on industrial research findings on the effects of stress concentration on the endurance limit.

ELEMENTS OF FERROUS METALLURGY. By Joseph L. Rosenholtz and Joseph F. Oesterle. 258 pages, 6 by 9 inches; 140 illustrations. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City. Price, $3.

This is the second edition of a work originally published several years ago. The science of metallurgy has made great strides since the first edition was published. New practices have been introduced, new alloys have been invented, and new theories have been advanced. Such changes have taken place in every metallurgical field. In revising their book, the authors have taken due cognizance of these advances in metallurgy and have introduced much new material. Briefly, the book covers: The Blast Furnace; the Bessemer Process; the Open-Hearth Process; the Electric Process; Wrought Iron; the Cementation and Crucible Processes; Ingots; the Iron-Carbon System; the Mechanical Treatment of Steel; the Heat-Treatment of Carbon Steels; the Elements in Carbon Steels; the Analyses and Uses of Carbon Steels; Alloy Steels; Cast Irons; the Foundry.

PRINCIPLES OF ENGINEERING ECONOMY. By Eugene L. Grant. 431 pages, 5 1/2 by 8 1/4 inches; 17 illustrations, 41 tables. Published by the Ronald Press Co., New York City. Price, $3.75.

This is a revised edition of the author's earlier work, completely rewritten. The book is divided into four main parts: Planning economy studies to solve engineering problems; interest, the time element in economy; techniques for economy studies; and getting results from economy studies. The book is designed to help the engineer determine alternatives of an engineering proposal and to show him how to analyze the respective merits of each. It is also intended as an aid to young engineers in recognizing the dollars-and-cents considerations in engineering, design, and construction. The author is associate professor of economics of engineering at the Stanford University and a member of the American Society of Civil Engineers. He brings to his subject close to twenty years of intensive study and active participation in the type of work covered by his book.

DESIGN OF MACHINE MEMBERS. By Alex. Vallance. 514 pages, 6 by 9 inches; 306 illustrations. Published by the McGraw-Hill Book Co., Inc., New York City. Price, $4.

The author, who is associate professor of mechanical engineering at the University of Texas and chief designer of the Reed Roller Bit Co., has prepared this book for the use of students who have had some training in kinematics, mechanics, and factory processes. Using these subjects as a foundation, the author explains the theory involved in the design of machine elements and points out the variations from theory

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required by practical applications. Although numerous tables have been included for illustrative purposes and as aids in the solution of problems, no attempt has been made to make the book a reference handbook for machine designers. In twenty-three chapters, the book covers all the machine elements commonly met with, beginning with riveted and welded joints, bolts and screws, and continuing through to the design of chain and gear drives.

METALLURGY. By Carl G. Johnson, R. S. Dean, and J. L. Gregg. 149 pages, 5 1/2 by 8 1/2 inches; 82 illustrations. Published by the American Technical Society, Drexler Ave. at 58th St., Chicago, Ill. Price, $1.50.

The purpose of this book is to present in a simple way some of the knowledge that is available concerning the manufacture and the characteristics of the many metals and alloys used in industry. The text has been planned to serve only as an introduction to the science of metallurgy. Physical metallurgy has been stressed rather than the chemical side of the subject. A comprehensive study of physical metallurgy is believed by the authors to be of more practical value to the ordinary engineering student than a profound study of the chemistry of metals. Among the subjects covered in the book are: Properties of Metals; Testing of Metals; Manufacture of Iron and Steel; Shaping and Forming Metals; Heat-Treatments of Ferrous and Non-Ferrous Alloys; Steel Specifications; Carbon Steels; Alloy Steels; and Powder Metallurgy.

DIRECT-CURRENT MACHINERY. By Thomas C. McFarland. 439 pages, 5 1/4 by 8 1/4 inches. Published by the International Textbook Co., Scranton, Pa. Price, $4.

This textbook is designed primarily for use in courses on direct-current machinery by students majoring in electrical engineering. The first chapter is devoted to fundamental concepts of electricity and magnetism because it is felt that this material is essential for completeness, and because in many schools a brief review of fundamentals from an engineering point of view is considered necessary before the study of machines is begun. The book gives first a general idea of the assembly of these machines and then discusses the characteristics and control. Each chapter is supplemented by a list of references for further student investigation, and also by groups of practical problems.

STRUCTURAL ALUMINUM HANDBOOK. 211 pages, 5 1/2 by 8 1/4 inches. Published by the Aluminum Company of America, Pittsburgh, Pa. Price, $1.25.

This is the second edition of a handbook on structural aluminum, covering the characteristics, manufacture, fabrication and design of aluminum alloy structural products. The new edition presents for the first time fundamental information regarding the ultimate strength of aluminum structural members. The data given is based on laboratory investigation, field tests, and extensive practical experience. Considerable progress has been made since the publication of the first edition of this book in the manufacture of aluminum alloy structural products and in the design and fabrication of structures employing these products. The text has been revised to bring it up to date and to include information on the latest developments.

BIBLIOGRAPHY ON INDUSTRIAL RADIOGRAPHY. By Herbert R. Isenburger. 52 pages, 8 1/2 by 11 inches. Published by the American Documentation Institute, 2101 Constitution Ave., Washington, D. C. Price, $3.32.

The author of this bibliography, due to his connection with the St. John X-Ray Service, Inc., Long Island City, N. Y., is well qualified for the work he has undertaken. The present bibliography is a supplement to his book on the same subject published in 1934 by John Wiley & Sons, Inc., New York. The present supplement contains 776 references. In addition to being obtainable in the 8 1/2- by 11-inch size mentioned, it can be secured in microfilm (35-millimeter standard safety photographic film to be used in so-called "reading machines"). The price of the microfilm is 72 cents.

JIGS AND FIXTURES. By Fred H. Colvin and Lucian L. Haas. 354 pages, 6 by 9 inches. Published by the McGraw-Hill Book Co., New York City. Price, $3.50.

This is the third edition of a book on jigs and fixtures for the production of interchangeable parts, the first edition of which was published in 1913. The developments in this field of mechanical work have necessitated a complete revision of the volume. While much of the original material has been retained, because it deals with the fundamentals of jig and fixture design, it has been rearranged and reinforced with much new information.

INDUSTRIAL MACHINERY AND MACHINE TOOLS—A Section of Poor's Industry and Investment Surveys. 32 pages, 8 by 10 1/2 inches. Published by Poor's Publishing Co., 90 Broad St., Wellesley, Mass. Price, $5.

This is a survey of the industrial machinery and machine tool industry covering the industry's position and outlook, potential demand, and a review of domestic and foreign markets. It contains some important industrial machinery business statistics and then analyzes thirty-three individual companies in the machinery field from the business point of view.

YOUR PLACE IN LIFE AND HOW TO FIND IT. A Handbook of Opportunity for Youth. By John B. McDonnell. 128 pages, 5 3/4 by 8 1/2 inches. Published by The Trailblazers, Champaign, Ill. Price, 25 cents.

This book discusses twenty-two major vocations and trades, outlining the work done in each field and indicating the methods of training required and the opportunities for promotion. Special chapters are devoted to such trades as tool- and die-making, foundry work, sheet-metal working, machine shop work, and welding.

STUDIES OF HAND MOTIONS AND RHYTHM APPEARING IN FACTORY WORK. By Ralph M. Barnes and Marvin E. Mundel. 62 pages, 6 by 9 inches. Published by the University of Iowa, Iowa City, Iowa, as Bulletin No. 12 of a series on Studies in Engineering. Price, 40 cents.

PERSONNEL AND INDUSTRIAL RELATIONS. Edited by J. E. Walters and R. J. Greenly. 164 pages, 6 by 9 inches. Extension Series No. 41. Published by Purdue University, Lafayette, Ind.

SILICOSIS IN THE FOUNDRY INDUSTRY. By Dr. Leonard Greenburg. 36 pages, 6 by 9 inches. Published by the American Foundrymen's Association, 222 W. Adams St., Chicago, Ill.

* * *

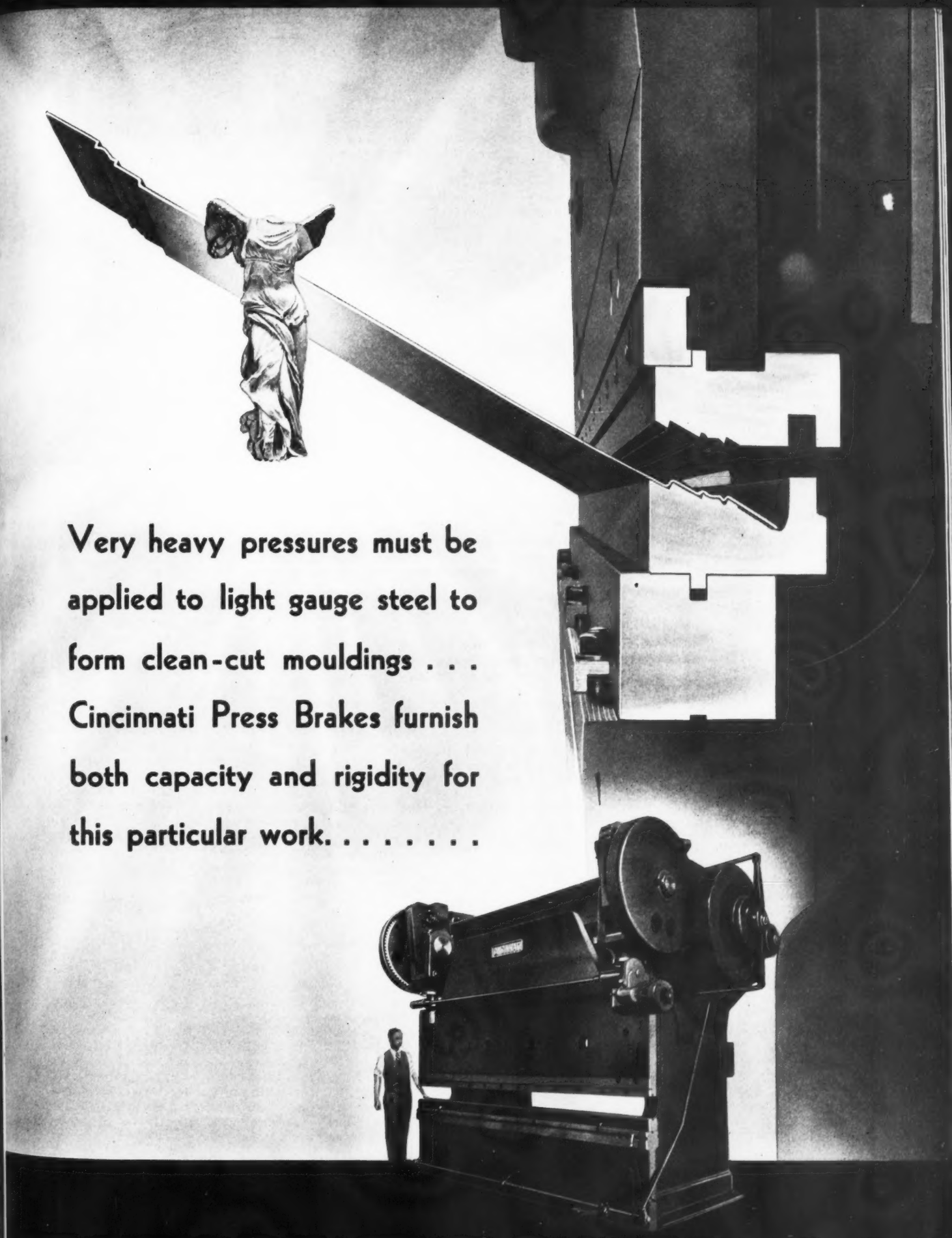
Six Per Cent Earned on Tool Cost Every 63 Minutes

Five Carboloy cemented carbide tools are used to face and form a radius and bore two diameters on silicon-aluminum motor housings for the Rexair home conditioner. Compared with the previous tools used, these tools paid for themselves in the first eighteen hours of operation. Their subsequent use for thirty-one days yielded a 6 per cent return on the original tool investment every sixty-three minutes of operation—a total saving in this time of $572. No resharpening of the tools had been necessary up to that point.

* * *

Selling Machinery in Scandinavia

In commenting upon the best way in which to introduce and sell American machinery and other products in the Scandinavian countries, a representative of several manufacturers in the United States points out that for best results an agent should be appointed in each of the Scandinavian countries. He mentions that a Swedish manufacturer prefers to buy from a Swedish agent, while a Norwegian manufacturer wants to buy from a Norwegian agent. Neither of them likes to do his buying through a Danish agent.



Very heavy pressures must be applied to light gauge steel to form clean-cut mouldings . . . Cincinnati Press Brakes furnish both capacity and rigidity for this particular work. . . . . .

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COMING EVENTS

SEPTEMBER 15-17—Second fall technical conference of the AMERICAN FOUNDRYMEN'S ASSOCIATION at the Michigan Union Bldg., University of Michigan, Ann Arbor, Mich. Professor Richard Schneidewind, Department of Metallurgical Engineering, University of Michigan, is chairman of the Meetings Committee.

SEPTEMBER 19-23—SEVENTH INTERNATIONAL MANAGEMENT CONGRESS at Washington, D. C. Executive secretary, Nathaniel W. Barnes, Room 1201, 347 Madison Ave., New York City.

SEPTEMBER 21-23—Sixteenth annual conference of the NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION at the Hotel Statler, Cleveland, Ohio. Stanley Knisely, general conference chairman, Republic Steel Corporation, Cleveland, Ohio; Ralph Leavenworth, program committee chairman, Fuller & Smith & Ross, Inc., Cleveland, Ohio.

SEPTEMBER 22-24—Nineteenth annual meeting of the AMERICAN TRADE ASSOCIATION EXECUTIVES at the William Penn Hotel, Pittsburgh, Pa. For further information, address American Trade Association Executives, 726 Jackson Place, Washington, D. C.

OCTOBER 5-7—Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at Hotel Biltmore, Providence, R. I. C. E. Davies, secretary, 29 W. 39th St., New York City.

OCTOBER 10-12—Semi-annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at Skytop Lodge, Cresco, Pa., J. C. McQuiston, manager-secretary, 701-2 Shields Building, Wilkinsburg, Pa.

OCTOBER 10-14—NATIONAL SAFETY CONGRESS, to be held at the Stevens Hotel, Chicago, Ill., under the auspices of the National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

OCTOBER 13-15—National Aircraft Production Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Ambassador Hotel, Los Angeles, Calif. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

OCTOBER 14-15—Semi-annual meeting of the AMERICAN SOCIETY OF TOOL ENGINEERS at Pittsburgh, Pa. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

OCTOBER 14-16—FOREMEN'S EXPOSITION to be held in Goodyear Hall, Akron, Ohio, under the auspices of the National Association of Foremen, and in conjunction with the fifteenth annual convention of the Association. For further information address Clapp & Poliak, Inc., 232 Madison Ave., New York City.

OCTOBER 16-21—Annual meeting of the AMERICAN WELDING SOCIETY at Book-Cadillac Hotel, Detroit, Mich.

OCTOBER 17-21—NATIONAL METAL CONGRESS AND EXHIBITION, to be held in Convention Hall, Detroit, Mich., under the auspices of the American Society for Metals. Further information can be obtained by communicating with W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

OCTOBER 27-29—First regional conference of the Chicago Chapter of the AMERICAN FOUNDRYMEN'S ASSOCIATION at Purdue University, Lafayette, Ind. For further information address Professor William Knapp, Assistant Dean of Engineering, Purdue University, Lafayette, Ind.

NOVEMBER 11-19—NATIONAL AUTOMOBILE SHOW at Grand Central Palace, New York City, under the auspices of the Automobile Manufacturers Association, 366 Madison Ave., New York City.

NOVEMBER 14-16—National Transportation Engineering Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Commodore Hotel, New York City. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

DECEMBER 5-9—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Building, 29 W. 39th St., New York City. C. E. Davies, secretary, 29 W. 39th St., New York City.

DECEMBER 5-10—THIRTEENTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING at Grand Central Palace, New York City. For further information, address International Exposition Co., Grand Central Palace, New York.

JANUARY 9-13, 1939—Annual Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at Detroit, Mich. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

FEBRUARY 23-25, 1939—Spring meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at St. Charles Hotel, New Orleans, La. C. E. Davies, secretary, 29 W. 39th St., New York City.

MARCH 13-18, 1939—Annual meeting and MACHINE AND TOOL PROGRESS EXPOSITION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS at Detroit, Mich. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

MAY 28-JUNE 8, 1939—WORLD AUTOMOTIVE ENGINEERING CONGRESS to be held in New York, Indianapolis, Detroit, and San Francisco under the auspices of the Society of Automotive Engineers. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

Improved Lamp Guard for Industrial and Railway Applications

An interesting development in lamp guards for industrial applications has been brought out by the Safeguard Electric Co., Inc., 1 DeKalb Ave., Brooklyn, N. Y. The outstanding feature of this wire lamp guard is a patented rubber ring lock, so arranged that the only tool required when the lamp bulb is to be replaced is the workman's thumb. The metal guard is supported both on the inside and outside by this heavy rubber shock-absorbing ring, which prevents vibration and shock from being transmitted directly to the lamp, thus increasing the life of the filament and preventing lamp breakage. The lamp guard can be removed, the lamp and reflector cleaned, and the guard replaced in about thirty seconds.

* * *

Hardening Costs Reduced 35 Per Cent

According to information obtained from the General Electric Co., Schenectady, N. Y., one of the company's 130-kilowatt scale-free hardening furnaces has reduced hardening costs on a variety of small parts made by the screw machine products plant of the National Acme Co., Cleveland, Ohio, by 35 per cent. In addition to this saving, pickling and refinishing processes are omitted in the case of threaded parts.

It is also stated that this equipment produces more uniform hardening and a greater degree of hardness on water-quenched work. The furnace has a rating of 800 pounds of work per hour; it has proved capable of heating 1000 pounds of parts per hour uniformly. After the furnace had been in operation some time, it was found that the daily output had increased by about 15 per cent.

* * *

The French Machine Tool Industry

According to *World Machinery News*, published by the Machinery Division of the Bureau of Foreign and Domestic Commerce, last year brought a great revival in the activity of the French machine tool industry, largely due to the purchases made directly or indirectly for national defense. The industry was also called upon to fill many orders that might have gone abroad had it not been for the long deliveries of most foreign competitors. In addition, there was a considerable importation of machine tools valued at about $7,000,000. Most of these machine tools were imported from the United States. Germany and Great Britain were the two suppliers next in importance.

Lincoln Foundation Prizes Awarded

THE Jury of Award of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, after judging thousands of papers submitted in the $200,000 Award Program announced by the Foundation about a year and a half ago, has made 382 awards for papers submitted, in amounts ranging from $101.75 for honorable mention to what is known as the "Grand Award" of $13,941.33. The recipients of awards include engineers, designers, architects, production managers, superintendents, draftsmen, shop foremen, mechanics, inspectors, welding supervisors and operators, college professors, high school instructors, and students. The subjects dealt with represent practically every product and structure of industry.

Mr. and Mrs. A. E. Gibson, who Received the Grand Award in the Lincoln Arc Welding Foundation Competition

In the two machinery classifications, 165 awards were made, totaling $62,222.82. The largest award for a paper in the machinery field was given to Robert E. Kinkead, consulting engineer in welding practice, Carnegie Illinois Steel Co., Cleveland, Ohio. Mr. Kinkead's award amounted to $8852.94, the third largest award made, for his paper "Industrial Machinery: Steel Making." In this paper he discusses the value of composite or clad metals and describes a method of forming a stainless steel coating on the surface of other steel by the aid of carbon arc welding.

The second largest award in the machinery division went to John Mikulak, mechanical engineer of the Electric Machinery Mfg. Co., Minneapolis, Minn., who received $3764.94 for his paper "Proposed Design for a Vertical Synchronous Motor or Alternating-Current Generator." The third largest award in the machinery division was given to J. O. Bishop, master mechanic and welding supervisor of the National Supply Co., Torrance, Calif., who received $2747.39 for his paper "Universal Manipulator."

The Grand Award for the entire competition was given to Mr. and Mrs. A. E. Gibson of the Wellman Engineering Co., Cleveland, Ohio, for an outstanding treatise covering thoroughly the elements required to assure technical, as well as business, success in the use of welding. Other large awards were won by Messrs. Pandya and Fowler of Diagrid Structures, Ltd., London, England, who received $11,397.06; and Messrs. Carey and Whitlock, American Air Lines, Inc., Chicago, Ill., who received $7326.46.

The Jury of Award that passed upon the papers submitted in the contest consisted of thirty-one engineering authorities from every part of the United States.

Robert E. Kinkead, who Received the Largest of the Lincoln Foundation Awards in the Machinery Division

John Mikulak, who Received the Second Largest Award in the Machinery Division of the Competition

J. O. Bishop, Recipient of the Third Largest Award for a Paper Relating to the Machinery Industry

Economical Cutters for every job—

MODERN CUTTERS THAT GIVE LOWEST REAL CUTTER COST

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NEWS OF THE INDUSTRY

Florida and Tennessee

BARNETT IRON WORKS, Palatka, Fla., has been organized, with E. C. McLEAN as general manager, to specialize in gray iron, chromium alloy, and brass and aluminum castings, and to operate a machine shop, blacksmith shop, and electric and acetylene welding shop. Mr. McLean was formerly with the R. O. Collins Iron Works, Tallahassee, Fla., and was an owner of the T. J. Barnett Foundry & Engineering Co., Palatka, Fla.

AMERICAN LAVA CORPORATION, Chattanooga, Tenn., has acquired the equipment and good will of the AMERICAN CERAMICS & SPECIALTIES CORPORATION, Jackson, Mich. The equipment will be removed to Chattanooga. CARL R. HOWER, vice-president and manager, and O. D. RISEDEN, production engineer, will be retained in their sales and engineering capacities with the American Lava Corporation.

Illinois

AHLBERG BEARING CO., Chicago, Ill., has been appointed nation-wide distributor for the products of BOWER ROLLER BEARING CO., Detroit, Mich. While the Bower company has been one of the largest manufacturers of roller bearings for almost twenty-five years, the company's sales have been almost entirely confined to the automotive industry. The Bower line will now be distributed in the industrial field through the Ahlberg Bearing Co., which also handles RBC roller bearings, Norma-Hoffmann ball bearings, CJB Master ball bearings, and Ahlberg ground bearings. The thirty-four branch warehouses of the Ahlberg company and its associate, PRECISION BEARINGS, INC., of Los Angeles, Calif., will handle the nation-wide distribution. Each of the branches will maintain a complete stock of standard types and sizes.

SKILSAW, INC., has started the construction of a 40,000-square foot factory and office building at Elston and Winnemac Aves., Chicago, Ill., to provide increased facilities for the manufacture of its line of portable electric saws, drills, and sanders. The new plant will cover an area of 150 by 200 feet, and will be partly one and partly two stories.

R. G. HASKINS CO., manufacturer of flexible shaft equipment and high-speed tapping machines, has moved to larger quarters at 615 S. California Ave., Chicago, Ill.

New England

GEORGE S. JAMESON, supervisor of the Order and Stores Department of the General Electric Co.'s River Works Plant at Lynn, Mass., had a banquet given in his honor on the evening of September 1—the day that marked his fiftieth year of continuous service with the company. More than 400 persons attended the banquet. Particularly significant was the fact that the occasion was sponsored by a committee composed of men representing thirty different companies, who wished to express their appreciation of Mr. Jameson, with whom they have dealt in doing business with the General Electric Co. Mr. Jameson, who was born in 1874, began his association with the General Electric Co. in 1888, when he became office boy to Frederick Webster, then purchasing agent for the old Thomson-Houston Co.

MICRO SWITCH CORPORATION, Freeport, Ill., has divided its eastern territory and has appointed the ELECTRICAL APPARATUS CO., of Boston and Hartford, its New England representative. The corporation's New York office will continue to service the remainder of the East on precision and limit switches.

FARREL-BIRMINGHAM CO., INC., is adding a new foundry building to its Ansonia, Conn., plant. The new building will have 4000 square feet of floor area to take care of increased output.

New York and New Jersey

R. B. BARNETT, formerly assistant manager of sales of the Union Drawn Steel Division of the Republic Steel Corporation, Massillon, Ohio, has become manager of the Buffalo office of Peter A. Frasse & Co., Inc., New York City, steel distributors, with warehouses in New York, Buffalo, Philadelphia, and Newark. Mr. Barnett entered the steel industry in 1914 in the Philadelphia office of Peter A. Frasse & Co.

GROBET FILE CORPORATION OF AMERICA, 3 Park Place, New York City, announces that the corporation has just put on the market a complete line of rotary files consisting of hand rotary files, hand-cut rotary rasps, milled-cut files for drill presses, and milled-cut files for general use. These four classes of files are made from either high-speed steel or chromium steel.

E. G. MANSFIELD, formerly vice-president and treasurer of Samuel C. Rogers & Co., Buffalo, N. Y., manufacturer of automatic saw and knife grinding machinery, was recently elected president of the company. Mr. Mansfield has been actively identified with the business for twenty-five years. He succeeds Oliver Cabana, Jr., who died early this year.

CONTINENTAL MACHINE SPECIALTIES, INC., 1301 Washington Ave., S., Minneapolis, Minn., have opened a new sales office and display room at 119 Lafayette St., New York City, under the management of D. A. MOREINIS. The new office operates under the name of the DOALL EASTERN MACHINE CO., and covers the New England, New York, and Philadelphia territories.

H. J. FRENCH, of the Development and Research Division of the International Nickel Co., Inc., New York City, spoke before the Northwest Chapter of the American Society for Metals September 16, at Minneapolis, Minn., on high alloy steels, alloy steel welding, and other subjects connected with the application of alloy steels.

TWIN DISC CLUTCH CO., Racine, Wis., has opened a new parts and service office under the name of TWIN DISC PARTS AND SERVICE, INC., at 195 Tenth Ave., New York City. W. L. DIXON, SR., for many years eastern sales and service engineer of the Twin Disc Clutch Co., is manager of the new office.

F. H. DOREMUS has been appointed district manager of the Industrial Department, Rocky Mountain District, of the General Electric Co., Schenectady, N. Y. He succeeds HENRY C. GLAZE, who has retired under the company pension plan, after a period of thirty-nine years of service.

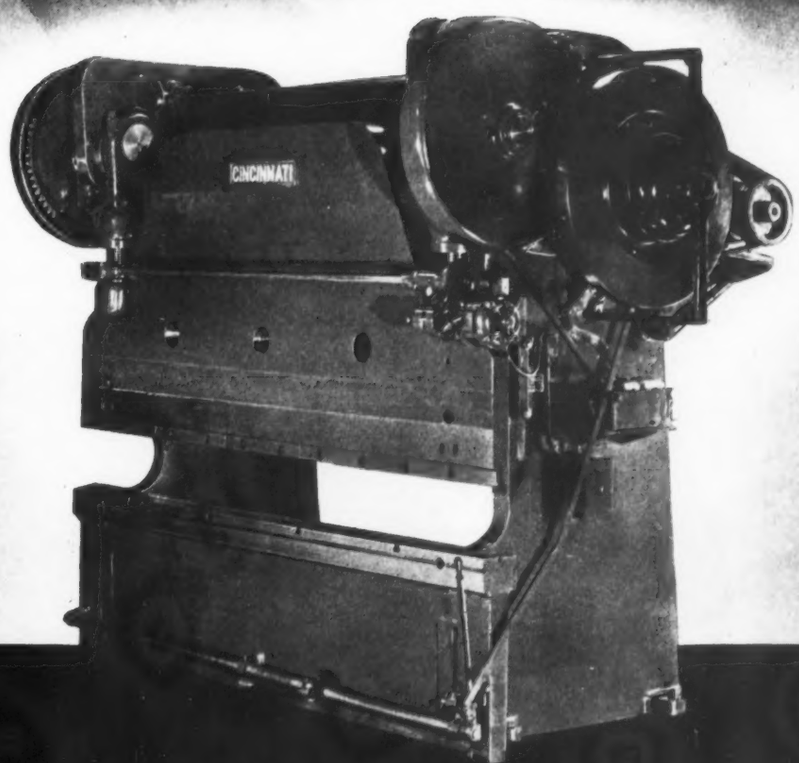
RALPH J. REICH has been appointed manager of the Buffalo branch of the Hoist and Body Division of Gar Wood Industries, Inc., Detroit, Mich. Mr. Reich has been connected with the Buffalo branch for a number of years in the capacity of assistant manager.

DRIVER-HARRIS CO., Harrison, N. J., announces that the company is represented by the ELECTRICAL SPECIALTY CO., 449-451 S. Pedro St., Los Angeles, Calif., and by the same company at 714 Fourth Ave., Seattle, Wash.

Ohio

L. I. BARKER, formerly manager of sales of the Cleveland district office of the Union Drawn Steel Division of the Republic Steel Corporation, Massillon, Ohio, has been appointed assistant manager of sales, with headquarters at Massillon. Mr. Barker, who was formerly with the Carnegie Steel Co., became associated with the Union Drawn Steel organization in 1923 as salesman in the Cleveland sales office, and became manager of that office in 1929. A. G. C.

Powerful Cincinnati Press Brakes operating with machine tool accuracy . . . make multiple bends straight and true . . . . . .

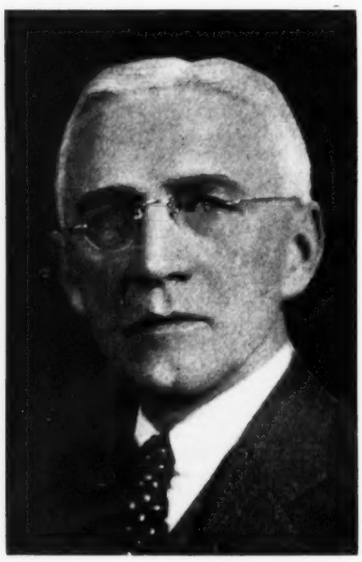


THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

QUAY, a salesman in the Cleveland office, will succeed Mr. Barker as Cleveland district sales manager.

J. W. MERIAM, for the last twenty-four years vice-president and secretary of the Lincoln Electric Co., Cleveland, Ohio, has retired from active service, but will remain a director of the company. Mr. Meriam joined the Lincoln Electric Co.



J. W. Meriam, Who is Retiring as Vice-president of the Lincoln Electric Co.

in 1914 and has seen the company develop from very modest beginnings to a prominent position in the arc-welding industry, with branch offices throughout the United States and factories in this country, England, Canada, and Australia. A. F. DAVIS, for many years a vice-president of the company, will succeed Mr. Meriam as secretary.

SALEM ENGINEERING CO., Salem, Ohio, manufacturer of industrial heating equipment, has appointed WILLIAM N. GOGGIN, of the Goggin & Goggin Co., 407 S. Dearborn St., Chicago, Ill., sales representative in the Chicago district. F. R. WILSON, 27639 Lathrup Blvd., Birmingham, Mich., has been appointed sales representative in the Detroit district.

TIMKEN ROLLER BEARING CO., Canton, Ohio, has recently opened offices at 519 Transportation Bldg., Washington, D. C., in order to provide immediate engineering facilities to the various governmental departments. A. L. CAMPBELL will have charge of the new offices.

Pennsylvania

J. R. FUNK, service engineer for the Landis Machine Co., Waynesboro, Pa., in Oklahoma and Texas, left Miami on September 3 by the Pan-American Airways for a trip through South America. Mr. Funk will service Landis die-heads and Landis thread cutting machines in the industrial shops throughout South America, as well as in the oil fields. His work in Oklahoma and Texas will be taken over by WILLIAM B. BAKER.

FLOYD T. HAGUE, has been appointed manager of engineering of the Steam Division at the South Philadelphia Works of the Westinghouse Electric & Mfg. Co. Mr. Hague has been with the Westinghouse company since he graduated from the Western University of Pennsylvania in 1911.

ALLEGHENY STEEL CO., and LUDLUM STEEL CO., announce the formation of the ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa. Until further announcement, the business of the new company will be handled through the present channels.

FRANK D. NEWBURY has been appointed manager of the NEW PRODUCTS DIVISION of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., succeeding the late Herbert Mygatt Wilcox.

Wisconsin

GISHOLT MACHINE CO., Madison, Wis., recently set aside a day for "open house" at the company's plant, the purpose of which was to give all employes and their families an opportunity to get better acquainted and to become more familiar with the activities of the company. Over 2000 people, including employes, their wives, sweethearts, children, parents, and even "inlaws" passed through the huge plant.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., announces the removal of its Dallas, Tex., district office to 1800 N. Market St., where the Power, Electrical, and Industrial Divisions of the company now occupy an entire building.

* * *

Tool Engineers Hold Meeting in Rockford

The Rockford-Freeport-Beloit chapter of the American Society of Tool Engineers held its first anniversary meeting at the Faust Hotel, Rockford, Ill., September 29. Ralph E. Flanders, president of the Jones & Lamson Machine Co., Springfield, Vt., and past-president of the American Society of Mechanical Engineers and of the National Machine Tool Builders Association, made the principal address. In conjunction with the meeting, a number of tool manufacturers exhibited small tools and machine shop accessories on a floor set aside for that purpose at the Faust Hotel.

COMING EVENTS

OCTOBER 5-7—Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at Hotel Biltmore, Providence, R. I. C. E. Davies, secretary, 29 W. 39th St., New York City.

OCTOBER 10-11—Annual meeting of the ASSOCIATED MACHINE TOOL DEALERS OF AMERICA at the Hotel Alms, Cincinnati, Ohio. Thomas A. Fernley, Jr., executive secretary, 505 Arch St., Philadelphia, Pa.

OCTOBER 10-12—Semi-annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at Skytop Lodge, Cresco, Pa. J. C. McQuiston, manager-secretary 701-2 Shields Building, Wilkinsburg, Pa.

OCTOBER 10-14—NATIONAL SAFETY CONGRESS, to be held at the Stevens Hotel, Chicago, Ill., under the auspices of the National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

OCTOBER 13-15—National Aircraft Production Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Ambassador Hotel, Los Angeles, Calif. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

OCTOBER 14-15—Semi-annual meeting of the AMERICAN SOCIETY OF TOOL ENGINEERS at Pittsburgh, Pa. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

OCTOBER 14-16—FOREMEN'S EXPOSITION to be held in Goodyear Hall, Akron, Ohio, under the auspices of the National Association of Foremen, and in conjunction with the fifteenth annual convention of the Association. For further information, address Clapp & Poliak, Inc., 232 Madison Ave., New York City.

OCTOBER 16-21—Annual meeting of the AMERICAN WELDING SOCIETY at Book-Cadillac Hotel, Detroit, Mich.

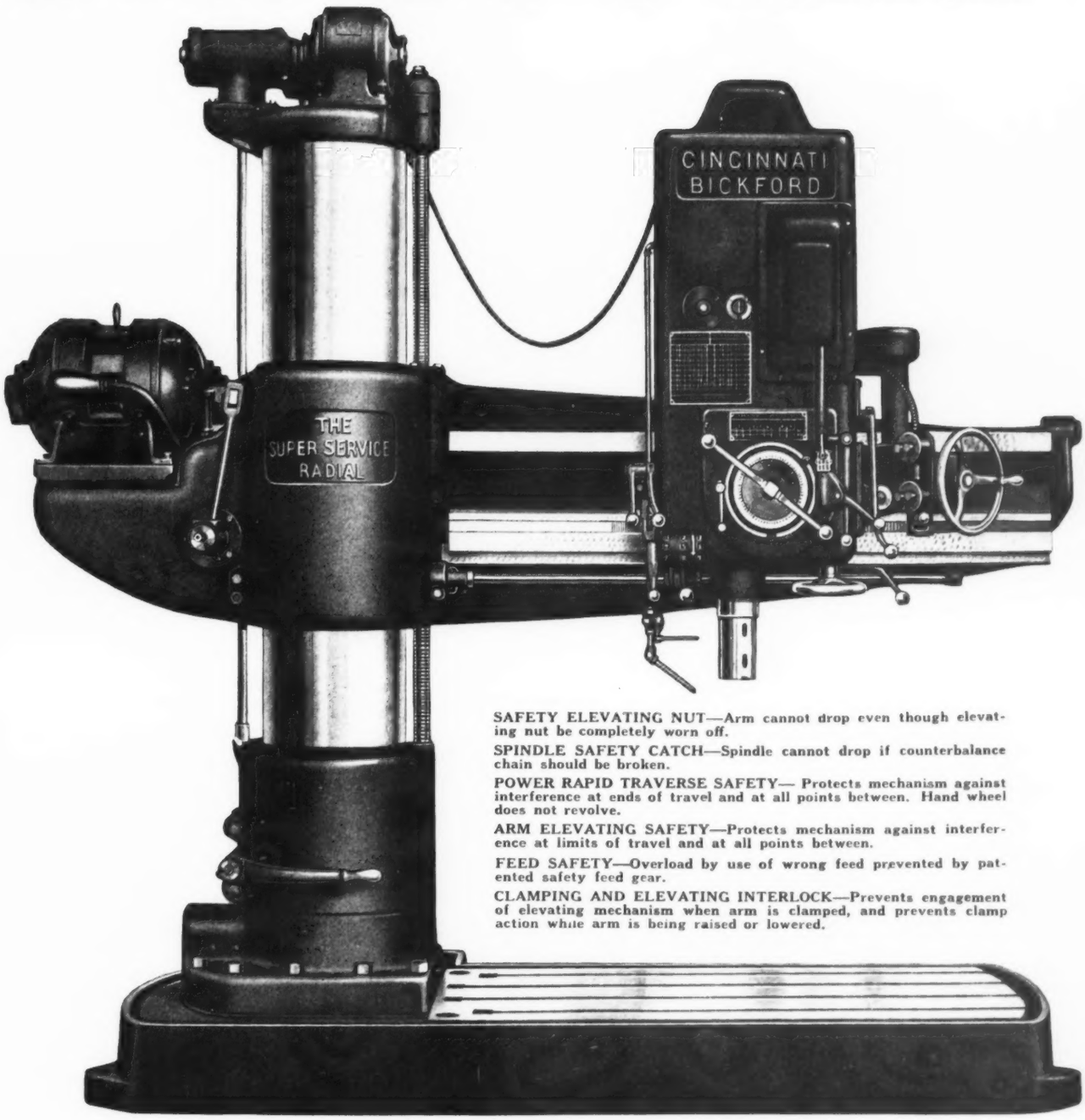
OCTOBER 17-21—NATIONAL METAL CONGRESS AND EXHIBITION, to be held in Convention Hall, Detroit, Mich., under the auspices of the American Society for Metals. Further information can be obtained by communicating with W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

OCTOBER 27-29—First regional conference of the Chicago Chapter of the AMERICAN FOUNDRYMEN'S ASSOCIATION at Purdue University, Lafayette, Ind. For further information, address Professor William Knapp, Assistant Dean of Engineering, Purdue University, Lafayette, Ind.

NOVEMBER 11-19—NATIONAL AUTOMOBILE SHOW at Grand Central Palace, New

SAFETY

Every safety measure that might conceivably become desirable is built into the Super-Service Radial . . . safety for tools and machine, and safety features that protect your operator.



SAFETY ELEVATING NUT—Arm cannot drop even though elevating nut be completely worn off.

SPINDLE SAFETY CATCH—Spindle cannot drop if counterbalance chain should be broken.

POWER RAPID TRAVERSE SAFETY— Protects mechanism against interference at ends of travel and at all points between. Hand wheel does not revolve.

ARM ELEVATING SAFETY—Protects mechanism against interference at limits of travel and at all points between.

FEED SAFETY—Overload by use of wrong feed prevented by patented safety feed gear.

CLAMPING AND ELEVATING INTERLOCK—Prevents engagement of elevating mechanism when arm is clamped, and prevents clamp action while arm is being raised or lowered.

Your investment in the Super-Service Radial is protected by its long life and high productivity. Illustrated Bulletin R-24 explains all these features in detail. May we send you a copy?

RADIAL AND UPRIGHT SUPER SERVICE C·B DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI, OHIO, U.S.A.

York City, under the auspices of the Automobile Manufacturers Association, 366 Madison Ave., New York City.

NOVEMBER 14-16—National Transportation Engineering Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Commodore Hotel, New York City. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

DECEMBER 5-9—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Building, 29 W. 39th St., New York City. C. E. Davies, secretary, 29 W. 39th St., New York City.

DECEMBER 5-10—THIRTEENTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING at Grand Central Palace, New York City. For further information, address International Exposition Co., Grand Central Palace, New York.

JANUARY 9-13, 1939—Annual meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at Detroit, Mich. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

FEBRUARY 23-25, 1939—Spring meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at St. Charles Hotel, New Orleans, La. C. E. Davies, secretary, 29 W. 39th St., New York City.

MARCH 13-18, 1939—Annual meeting and MACHINE AND TOOL PROGRESS EXPOSITION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS at Detroit, Mich. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

MAY 28-JUNE 8, 1939—WORLD AUTOMOTIVE ENGINEERING CONGRESS to be held in New York, Indianapolis, Detroit, and San Francisco under the auspices of the Society of Automotive Engineers.

JUNE 25-JULY 1, 1939—THIRTEENTH INTERNATIONAL CONGRESS OF CARBIDE, ACETYLENE, OXY-ACETYLENE WELDING AND ALLIED INDUSTRIES, to be held in Munich, Germany. For further information, address the International Acetylene Association, 30 E. 42nd St., New York City.

* * *

Slide-Rule for Calculating Weights of Materials

The Dayton Rogers Mfg. Co., Minneapolis, Minn., is distributing a slide-rule that gives instantly the correct weight of flat materials, including steel, aluminum, cast iron, copper, bronze, and lead, in widths of from 1/8 inch to 96 inches; in thicknesses of from 0.002 inch to 25 inches; in lengths of from 1 inch to 1000 feet; and in weights of from 0.1 pound to 10,000 pounds. This little calculator should prove useful to purchasing agents, engineers, salesmen, estimators, draftsmen, foremen, or anyone who wishes to determine the weights of flat metals quickly and accurately.

NEW BOOKS AND PUBLICATIONS

AIR-CONDITIONING. By Charles A. Fuller. 577 pages, 6 by 9 inches. Published by the Norman W. Henley Publishing Co., 2 West 45th St., New York City. Price, $4.

In view of the widespread interest in the subject of air-conditioning and its rapid rise in the industrial field, a comprehensive book on the subject, written by a man who has been connected with the air-conditioning field for twenty-five years and is in close touch with recent developments, should be of considerable value.

This book is a fundamental treatise on air-conditioning, air distribution, refrigeration, humidification, and air purification. It covers all the phases that may be encountered in design and construction work. The information is presented in as simple a manner as possible, so as to be readily understood by a person with an average knowledge of mathematics. Charts, diagrams, floor plans, and tables are included, of value to the engineer, contractor, and prospective buyer of air-conditioning equipment.

FOREMANSHIP AND SUPERVISION. By Frank Cushman. 286 pages, 5 by 7 1/2 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City. Price, $2.50.

This is the second edition of a handbook for foremen conference leaders and supervisors of vocational education. The original edition of this book was based on the experience of the author in the development and use of the conference procedure in connection with educational programs for industrial foremen and supervisors of vocational training. The increased interest in this subject has led to the publication of a revised and enlarged edition, which contains the results of the author's experience in the same field during the last ten years. The discussion of the principal types of conference objectives has been amplified, and an entirely new chapter on the selection of chart headings for different topics and different types of problems has been added, as well as a chapter entitled "Some Fundamental Principles of Good Supervision."

FATIGUE TESTS OF RIVETED JOINTS. By Wilbur M. Wilson and Frank P. Thomas. 116 pages, 6 by 9 inches. Published by the University of Illinois, Urbana, Ill., as Bulletin No. 302 of the Engineering Experiment Station. Price, $1.

STORIES OF AMERICAN INDUSTRY. Second Series. 150 pages, 6 by 9 inches. Published by the United States Department of Commerce. For sale by Superintendent of Documents, Washington, D. C. Price, 20 cents.

OBITUARIES

ROBERT B. BEALE, manager of the Turbine Division of the Central Station Department, General Electric Co., Schenectady, N. Y., died of a heart ailment September 11 after a brief illness, at the age of sixty years. Mr. Beale had been continuously associated with the General Electric Co. since 1899. He was born in Washington, D. C., and was a graduate of the Maryland State College, class of 1896, and of Johns Hopkins University, where he obtained the degree of electrical engineer in 1899.

CARL L. PFEIFER, treasurer of the Chain Belt Co., Milwaukee, Wis., died suddenly on August 24 in Philadelphia, Pa. He left Milwaukee the day previously for Philadelphia on business. Mr. Pfeifer was born in Chicago, Ill., in 1880 and had been with the Chain Belt Co. since 1914.

CHARLES H. SCHEERBAUM, purchasing agent of the Abrasive Co., Division of Simonds Saw and Steel Co., Philadelphia, Pa., died Thursday, September 8.

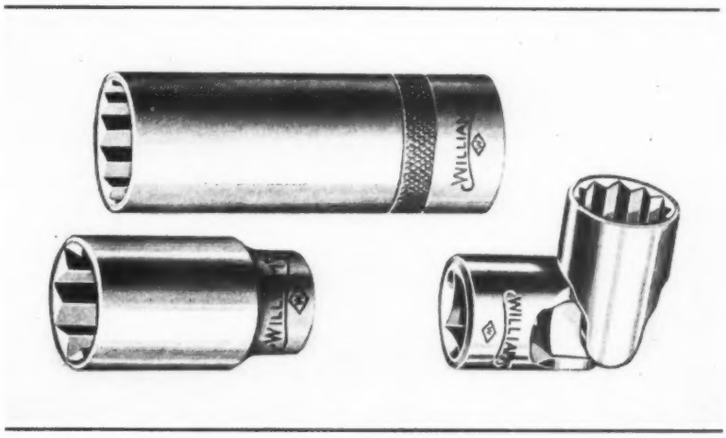
* * *

Stanley Works Announces Unishear Contest

The Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., has launched a contest to find out who owns the oldest "Mighty Midget" Unishear still in use. The winning company, shop, or person will receive a new "Mighty Midget." The contest opened September 15 and will continue to run until October 31. To compete in the contest, firms or individuals are requested to send to the Stanley Works the serial number of their Unishear and to describe briefly what type of work it is used for. It is expected that the oldest Unishear in use will not carry the name "Stanley," as "Mighty Midget" Unishears were not added to the Stanley line of electric tools until 1929. Previously they were made by the Unishear Co. of New York.

obtained with a 3/8-inch valve and a cylinder having a 3-inch bore and a 3-inch stroke, using an air pressure of 80 pounds per square inch.

The Logan bleeder valves can be used as three-way valves after the removal of a 1/4-inch pipe plug for the control of single-acting cylinders or in connection with pressure-operated bleeders. These bleeder valves and three-way valves are available for hand, foot, cam, pressure, or solenoid operation. They can be furnished for either base or side mounting. 88



Bantam Sockets Recently Added to Line of "Supersocket" Wrenches

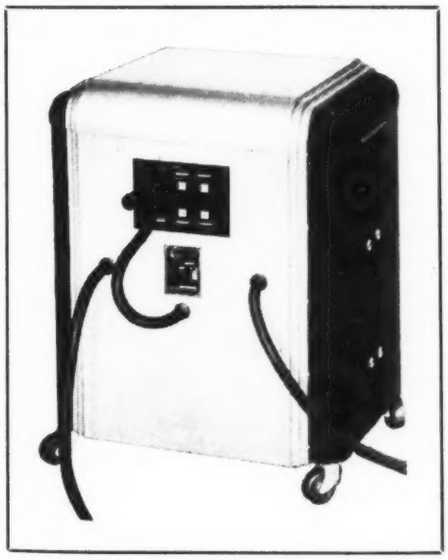
Bantam "Supersocket" Wrenches

J. H. Williams & Co., 61 Spring St., New York City, have added three new lines of Bantam sockets to their "Supersocket" line of wrenches. The new lines include extra deep 12-point sockets, 2 to 2 1/2 inches long, in six sizes, with openings 7/16 to 3/4 inch; extra deep 8-point sockets, 1 1/2 inches long, in four sizes, with openings 7/16 to 5/8 inch; and universal 12-point sockets in four sizes, with openings 7/16 to 5/8 inch. All the sockets are designed for use with ratchets and other handles fitted with 3/8-inch square drive, and have thin walls for operation in close or awkward places. The compact universal sockets will operate through a range of 180 degrees. 89

Commonwealth Electric Arc Welder

The Commonwealth Mfg. Corporation, 4208 Davis Lane, Cincinnati, Ohio, has recently developed a line of new type welders with transformer coils wound with heat-proof, burnout-proof, moisture-proof, glass-insulated magnet wire. The individual glass threads from which the insulation is woven are only 0.0002 inch thick. Tests have shown that the glass insulation will withstand temperatures up to nearly 1000 degrees F., whereas cotton insulation burns out completely at less than 300 degrees F. Welders in which this new insulating material is used can be employed in hot steamy surroundings and in acid or alkali fumes. They are also proof against mildew, aging, oil, grease, insects, etc., as well as high temperatures.

The 120-UL welder, which is a complete all-purpose machine, handles every type and size of welding from light sheet-metal work for automobile bodies or furnaces to heavy castings, machine parts, and structural steel. This welder has a wide range of welding heats—from 20 up to 120 amperes. The welder is housed in a steel cabinet which can be easily moved around the shop on its own rubberized casters. It is also light enough to be transported to outside jobs. 90



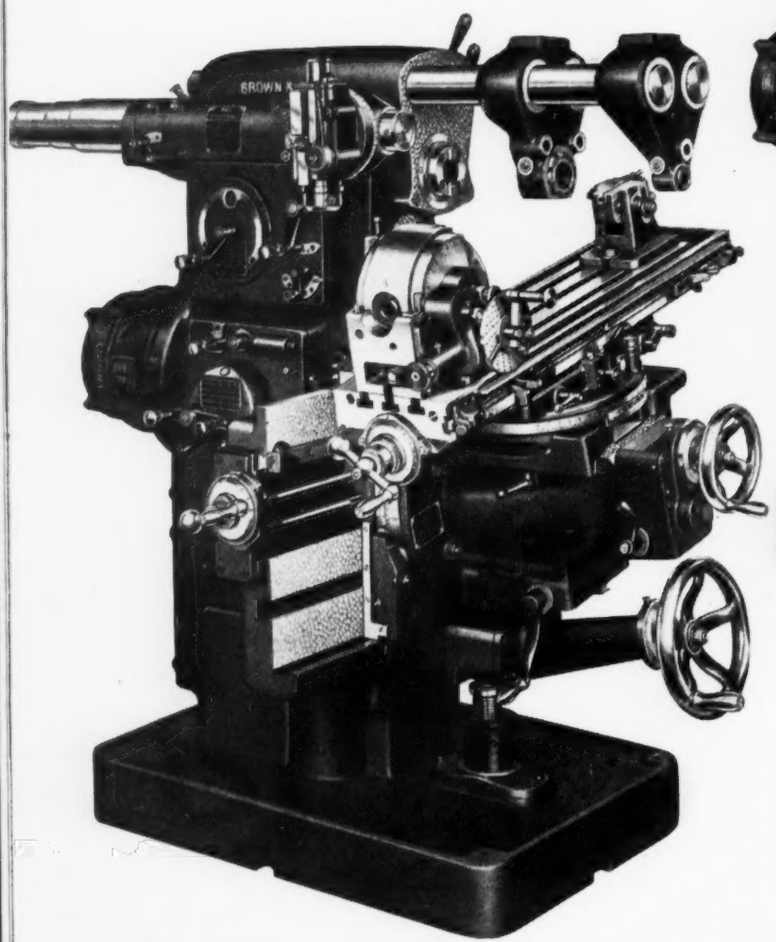
Commonwealth Arc Welder with Glass-insulated Magnet Wire

Natco Hydraulic-Feed Multi-Driller

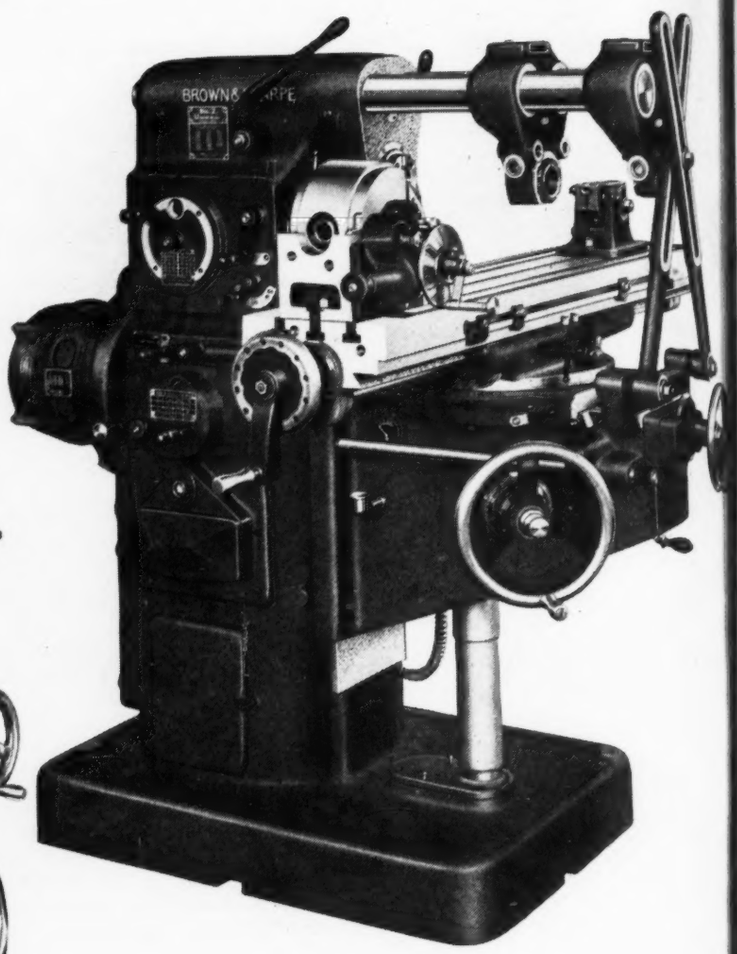
A heavy-duty hydraulic-feed adjustable multi-drilling machine for performing a variety of drill-

Multi-drilling Machine for Drilling Pipe Flanges and Valve Bodies

To obtain additional information on equipment described on this page, see lower part of page 222.



No. 0 Omniversal



No. 2 Universal
Light Type

PRODUCTIVE

. . . including the Unique Omniversal
—for the most exacting toolroom milling
requirements in production and accuracy.

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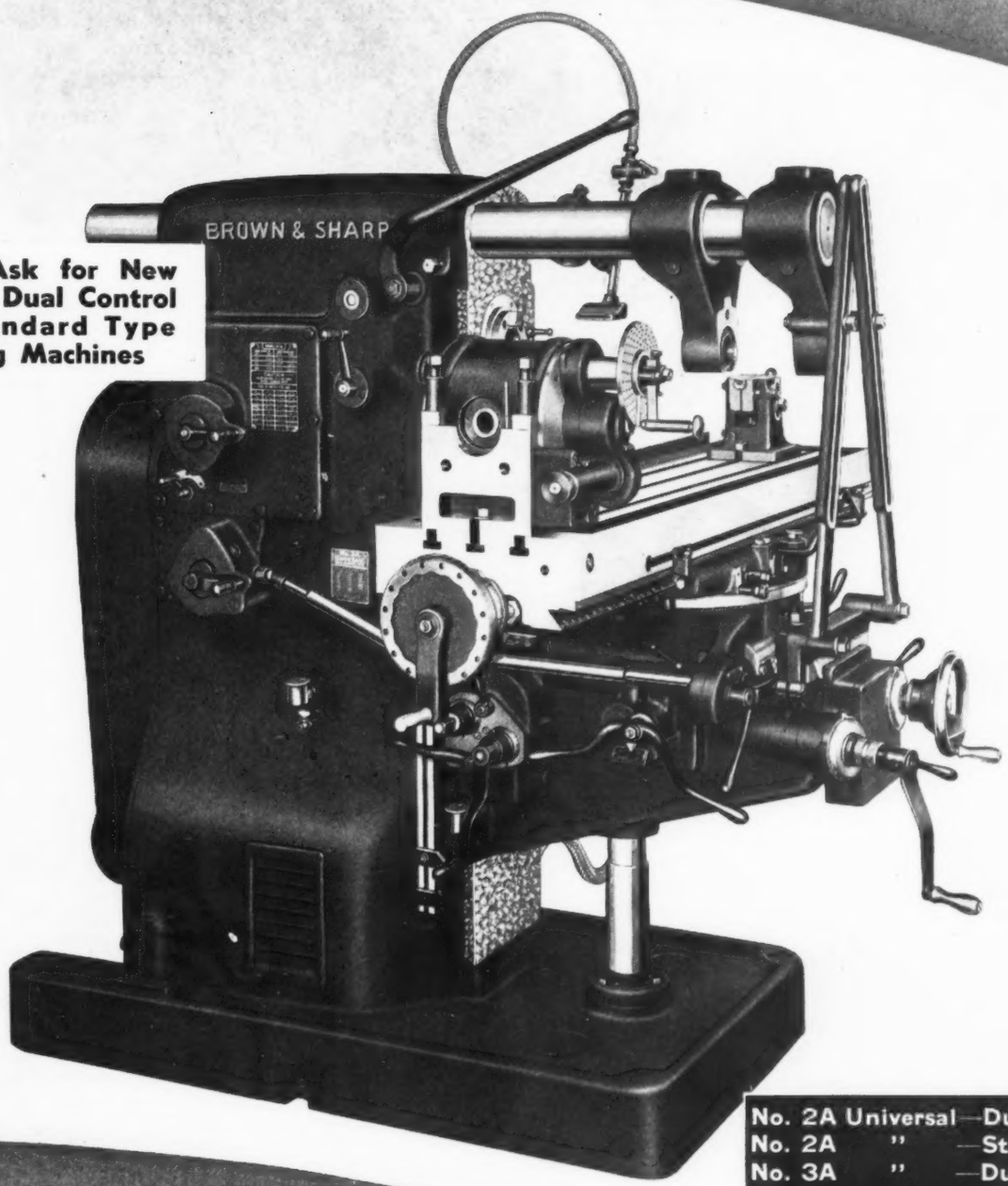
. . . Ask for New Book on Dual Control and Standard Type Milling Machines



No. 2A	Universal	—	Dual Control Type
No. 2A	"	—	Standard "
No. 3A	"	—	Dual Control "
No. 3A	"	—	Standard "

UNIVERSALS

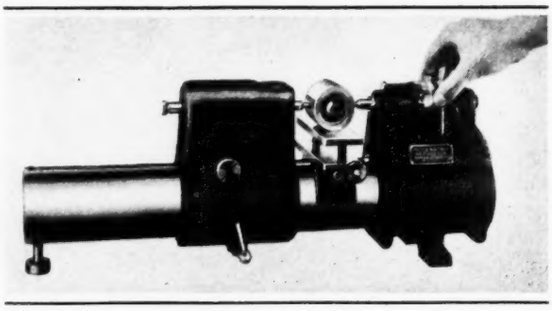
B·S

Investigate their many advantages for your work . . especially modern time-saving features. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

BROWN & SHARPE

ing operations on pipe flanges, valve bodies, and similar work has been added to the line of the National Automatic Tool Co., Richmond, Ind. This machine is of the new Natco "Holesteel" design, with a steel column and base and a large rectangular head having twelve 2 1/8-inch adjustable spindles.

It is equipped with a semi-automatic hydraulic feed and is operated and controlled by a single push-button station. A self-contained motor-driven coolant pump with an automatic shut-off for stopping the coolant flow when the tools are not at work is provided. 91

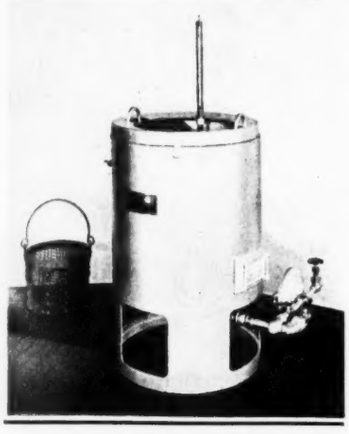


"Supermicrometer" with Elevating Table Used in Measuring Plug Gages

Tempering Pot for Tool-Room Use

The American Gas Furnace Co., Elizabeth, N. J., has just brought out a new oil- or salt-bath tempering furnace that has been especially designed for use in tool-rooms and small shops. This furnace can be used for temperatures ranging from 400 to 1000 degrees F., a salt bath being used for the higher temperatures. An insulating lining is designed to facilitate control, give more uniform results, and prevent the flash point of oil baths from being exceeded and causing fire.

The burner is supplied to use either air at one pound per square inch pressure and gas at line pressure or low-pressure gas only, with an atmospheric or Bunsen burner, as required. The furnace illustrated has a pot 11 inches in diameter by 10 1/2 inches deep. A similar furnace with a pot 17 inches in diameter by 12 1/2 inches deep can also be furnished. 92



Tempering Pot Brought out by the American Gas Furnace Co.

Pratt & Whitney "Supermicrometer" of Improved Design

An improved model of the "Supermicrometer" with a new pressure tailstock of basically different design has been brought out by Pratt & Whitney, Division Niles-Bement-Pond Co., Hartford, Conn. This measuring instrument is designed to bridge the gap between the hand micrometer and the more expensive measuring machine, and is intended for everyday shop use. It eliminates the human error in measuring accurately to 0.0001 inch over a range of 9 inches.

The machine consists of a heavy barrel, a micrometer headstock with a one-inch spindle travel reading in ten-thousandths inch and a pressure tailstock which can be moved to any position along the barrel. The operation of the device is simple. The instrument is set for taking any desired measurement by means of 1-inch standard size disks located in a channel bar directly below the measuring anvils. The channel bar holds the standard disks in alignment with the measuring anvils. With the size disks in place, the headstock anvil is set at zero, and the tailstock brought up until the anvil is in contact and the indicator needle registers on the line.

The tailstock is then clamped in place and the indicator needle realigned, using the dial, after which the vernier is set to zero. The standard disks and the channel bar are then removed, making the instrument ready for taking any measurement within the range for which it is set. The one-inch travel of the headstock anvil provides means for taking the final measurement.

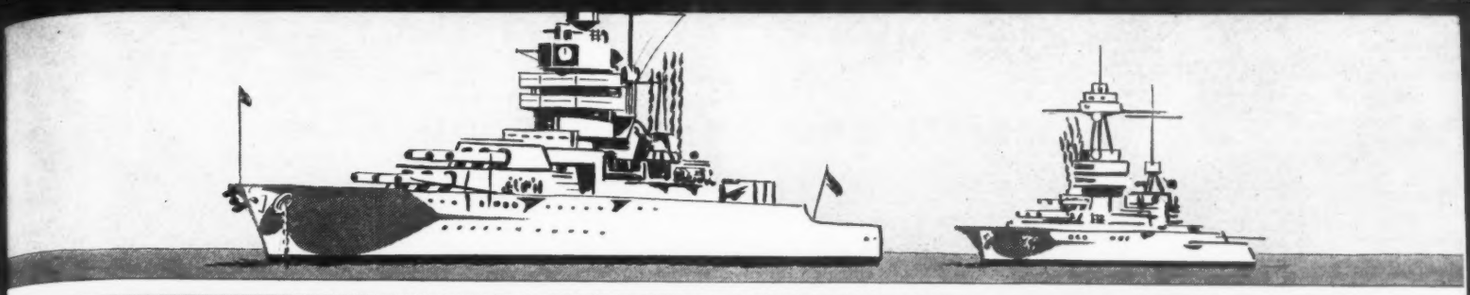
When the pointer in the pressure tailstock corresponds to the hair line, the pressure device is in operation, providing either 1 or 2 1/2 pounds pressure against the work. Either the lower or the higher pressure on the work is instantly available by setting the knob at the end of the tailstock spindle. 93

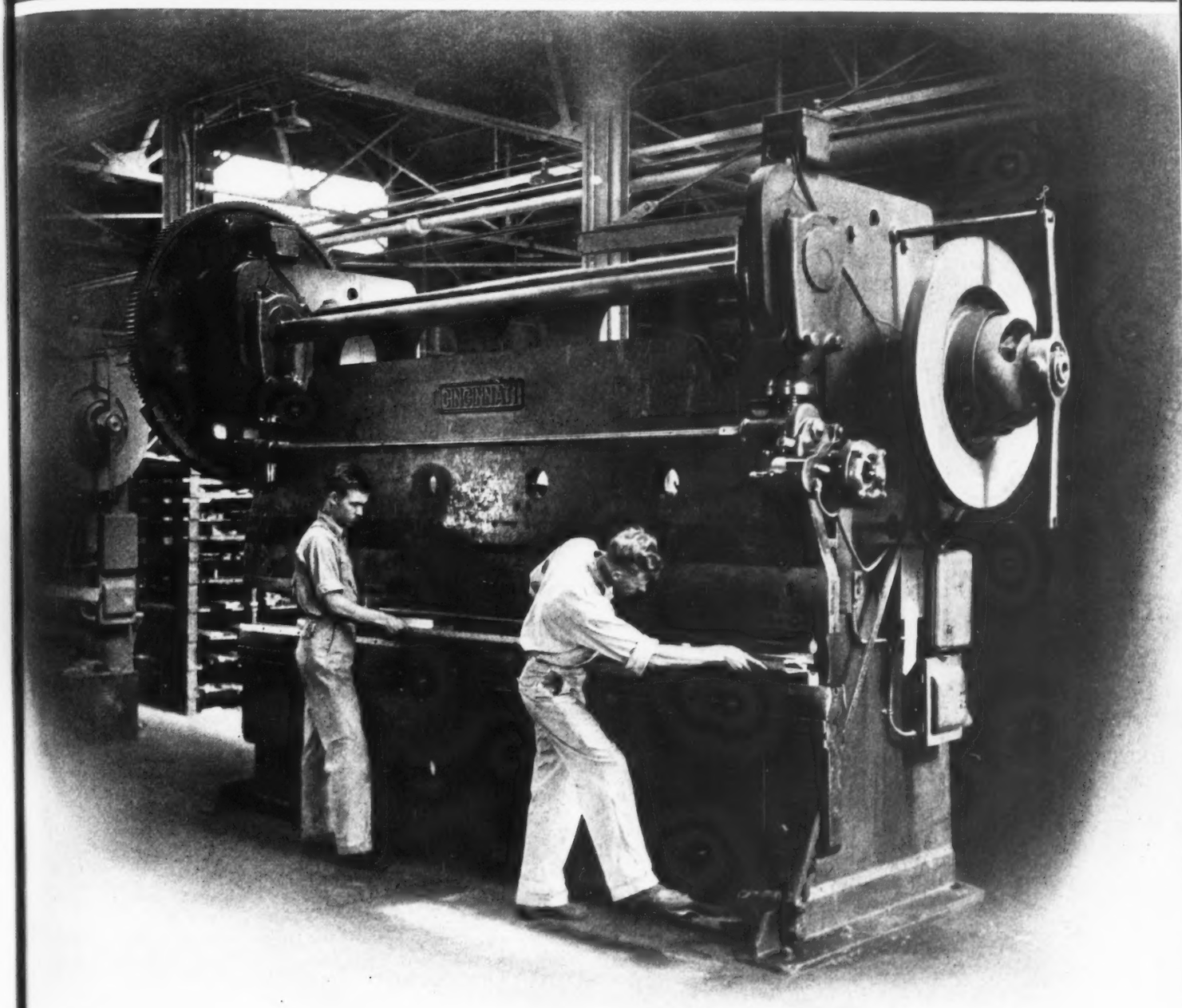
Multiple-Disk Clutch

A new model multiple-disk clutch designed for machine tool and other installations where space is limited has recently been

Multiple-disk Clutch Made by the Twin Disc Clutch Co.

To obtain additional information on equipment described on this page, see lower part of page 222.

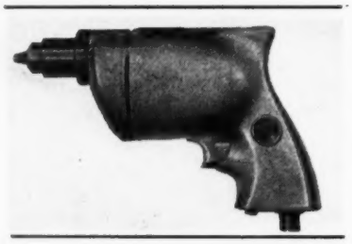




Cincinnati Press Brakes forming mouldings for deck covers. This machine at Newport News Shipbuilding and Dry Dock Company is one of the many Cincinnati Press Brakes in U. S. Navy and private shipyards. • • • • •

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES



"Holgun" Heavy-duty Electric Drill Made by Black & Decker

placed on the market by the Twin Disc Clutch Co., Racine, Wis. This new clutch, known as Model MT, is of simplified design, and has an easy, smooth engagement and release. It is available in nine different sizes, ranging from 3 to 8 inches in diameter, and in single or duplex units, to run dry or in oil. Minute adjustments on all sizes can be made from a single point to give maximum capacity with minimum lever pressure.....94

Black & Decker "Holgun"

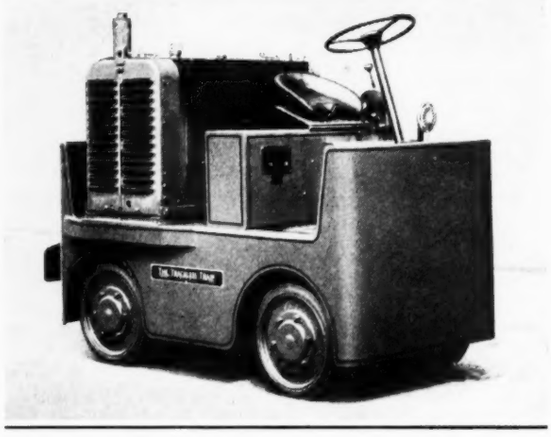
A heavy-duty production drill of the "pistol grip and trigger switch" type, having a capacity for drilling 1/4-inch holes in steel, has just been added to the line of portable electric tools made by the Black & Decker Mfg. Co., Towson, Md. This tool has been designed to combine perfect balance and compactness with smooth rugged power. It has anti-friction bearings throughout; fool-proof ventilation, with three screened inlets; pistol grip and trigger switch which adapt the tool for control with either hand; and simple construction that gives easy access to any part.

The universal motor has a no-load speed of 1700 revolutions per minute, and will operate on either alternating or direct current. The weight is 2 3/4 pounds, and the overall length 6 3/4 inches. A slow-speed model is also made, in which the no-load spindle speed is 500 revolutions per minute. The reduced spindle speed and the increased torque make the drill especially suited for production work in stainless steel, Monel metal, and other modern hard alloys.....95

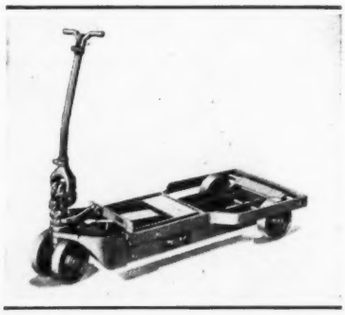
Mercury Heavy-Duty Electric Tractor

The Mercury Mfg. Co., 4044 S. Halsted St., Chicago, Ill., has placed on the market a heavy-duty electric tractor of the four-wheel drive, four-wheel steer type, which develops a 3500-pound draw-bar pull and a light running speed of seven miles per hour. The two heavy-duty double-reduction spiral-bevel and spur-gear drive axle assemblies have full-floating axle shafts and tapered roller-bearing mounted wheels. A heavy-duty series-wound vehicle type motor is provided for each drive, and the wheels are fitted with 20- by 6-inch solid rubber tires.

The brake system is of the four-wheel equalized type. The travel controller which governs both motors is of the Mercury mechanical contactor type, providing three speeds forward and reverse. The tractor shown in the illustration is equipped with a heavy-duty gas-electric unit, but a battery compartment can be furnished to accommodate the cells required for battery operation.....96



Mercury Tractor with Heavy-duty Gas-electric Unit



"Weld-Bilt" Lift Truck Made by West Bend Equipment Corporation

"Weld-Bilt" Hydraulic Lift Truck

A new hydraulic lift truck has recently been introduced on the market by the West Bend Equipment Corporation, West Bend, Wis. An outstanding feature of this truck is the self-contained hydraulic unit, which is placed in a horizontal position in the truck frame, where it is thoroughly protected from lateral and vertical shocks. The unit is entirely insulated from the head of the truck, and the only connections are through the connecting-rods from the pump lever to the pump rod. Maximum lift is secured by a minimum movement of the ram.

The head and frame are of all-welded steel. The standard lift is 3 inches, but higher lifts are available. The truck can be elevated to the maximum height with the handle swung to any position in a complete circle. The "free" handle release is located directly beneath the handle grip. The lowering pedal is on the head of the truck. The lowering speed is definitely controlled by foot pressure.

The front end of the truck has been given a streamline effect, with widely spaced front wheels designed to insure stability. These trucks are available in capacities of 2500, 3500, 5000, and 6000 pounds. Trucks of larger capacities can be furnished on special order.....97

To obtain additional information on equipment described on this page, see lower part of page 222.

Cincinnati Bickford SUPER-SERVICE RADIAL in the N. Y. NAVY YARD

THE Navy is quick to recognize and apply the benefits and improvements produced by the Cincinnati Bickford Tool Company as a result of its 64 years of specialized research and experience in designing and constructing radial and upright drilling machines.

Illustrated is a Super Service Radial at the New York Navy Yard, photographed while drilling 12 holes 1 1/16" dia. on the flanges of a triple-outlet bulkhead pipe elbow. Note the low, convenient and centralized position of all controls—located at the head to save time and operator fatigue.

Equally modern and valuable in shipbuilding, as well as in general practice, are the 36 spindle speeds in geometric progression—the 18 feed changes in geometric progression—the constant speed multiple disc driving clutches—the herringbone spindle driving gears—the safety head traverse — and the many other exclusive Super Service advantages.

Bulletin R-24 explains all—an illustrated, practical booklet on modern Radial Drill design and construction. Write for your copy. No obligation.

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI, OHIO, U.S.A.

"Radicon" Speed Reducer

Thomas Prosser & Son, 120 Wall St., New York City, are placing on the market the "Radicon" speed reducer, for which they are sole distributors in this country. This worm-gear speed reducer was developed by David Brown & Sons, Ltd., of Huddersfield, England. Special cooling methods and gear teeth of patented shape have been incorporated in the design of this reducer to give greater power with a normal rise in temperature. It is claimed that improvements in the design of this speed reducer have made possible a 30 per cent reduction in the size for a given capacity.

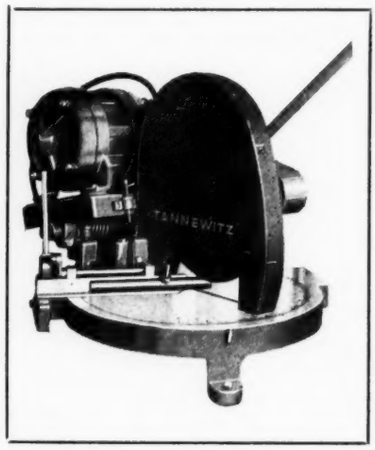
All the bearings are positively lubricated, a continuous oil-circulating system, effective from the lowest speeds, providing automatic lubrication. The lubricating system operates with the reduction gear rotating in either direction. An outstanding feature is the cooling system, which comprises a fan and means for the utilization of both radiation and convection. 98

"Radicon" Speed Reducer Introduced on the American Market by Thomas Prosser & Son

Tannewitz Bench Type Abrasive Cut-Off Machine

A bench type abrasive dry cut-off and miter machine with a circular ball-bearing table which can be swiveled to cut any angle from 45 degrees right to 45 degrees left, has just been brought out by the Tannewitz Works, Grand Rapids, Mich.

The one-horsepower electric motor drives a 10-inch abrasive wheel or metal-cutting saw blade. The machine will cut off and miter 1-inch 16-gage tubing; 3/4- by 3/4-inch 16-gage molding; and 1/2-inch round rods. The weight of the machine is 150 pounds. 99

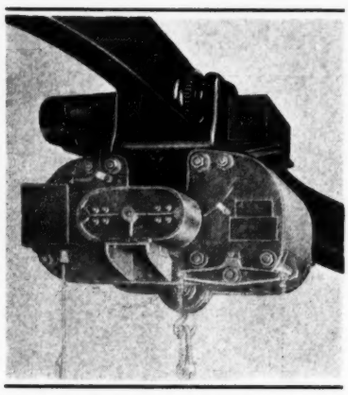


Bench Type Abrasive Cut-off Machine Made by Tannewitz Works

Motor Trolley for "Lo-Hed" Hoists

A new motor trolley, known as the Type RB, has been brought out by the American Engineering Co., Philadelphia, Pa., in capacities of one to three tons. This motor trolley is a separate unit furnished either in combination with the Class B "Lo-Hed" hoist made by this company or separately for converting hoists of the bolt suspension, plain trolley, or hand-geared trolley types to the motor-driven trolley type.

A short wheel-base, low head-room, and four-wheel drive characterize this equipment. Curves with a radius as small as 7 feet can be easily negotiated by the hoist. The head-room varies from 1 foot 9 inches to 3 feet 10 inches, depending upon the capacity of the hoist and the height of the lift. All four trolley wheels are gear-driven. The controller is of the drum type, fireproof, and completely protected from dust and moisture. The controller is operated by pendent cords. Special controls are also available. 100



Motor Trolley Developed by American Engineering Co. for "Lo-Hed" Hoists

* * *

A Hard-Facing Exhibit at the National Metal Show

At the National Metal Exposition in Detroit, which was held during the week beginning October 17, the Haynes Stellite Co. exhibited a great many parts that had been wear-proofed with hard-facing alloys. A large high-pressure steam valve, cut away and illuminated from the interior, opened and closed continuously to show the type of service for which alloy-coated seating surfaces have proved highly successful. An assortment of hard-faced dies, punches, and other metal-working tools were also on display, together with hard-faced fuel pump parts and other equipment accessories subjected to severe abrasion.

* * *

Out of every $100 taken in as total gross income (not profits) of industry, $3.90 was taken in taxes in 1929. These taxes rose to $5.70 in 1937. Present governmental policies will make still further increases necessary.

To obtain additional information on equipment described on this page, see lower part of page 222.

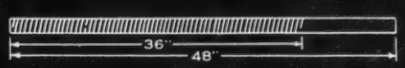
● FOR GRINDING LONG THREADED PARTS

Long threaded parts, such as lead, locating, adjusting and feeding screws, crank and cam shafts, landing gear strut parts, pipe and staybolt taps, drilling adaptors and many similar parts used in the automobile, aircraft, oil well drilling, machine and cutting tool industries are ground on Ex-Cell-O Precision Thread Grinders especially designed for handling long work.

You no longer need to scrap threaded parts because, after many expensive machining operations, they have been distorted in heat treatment. With an Ex-Cell-O Precision Thread Grinder you finish grind the threads *after hardening*, and *keep* extreme accuracy of thread form, lead, and pitch diameter. On long parts particularly, this results in great savings in manufacture, as well as better performance of the parts in actual operation.

Ex-Cell-O offers two machines, in two work ranges, for precision grinding long work. Let us show you how the accuracy of your parts can be increased, and their life and efficiency improved.

● Style No. 31—Size 5x20x36: Similar, except for the master lead screw and work table, to the Style No. 31 originally brought out in 1935. Externally threaded sections up to 5" *diameter, 20" long, on work up to 36" long between centers*, can be ground in either or both directions.



● Style No. 35—Size 8x36x48: Similar except for the master lead screw and work table, to the Style No. 35 first announced in 1936. Grinds *external* threaded sections up to 8" *diameter 36" long, on work up to 48" long between centers* (or with a special work table extension, work up to 60" long between centers). With an attachment, grinds *internal* threads on work from 1" to 8" inside diameter. Hydraulically operated, grinds in either or both directions.

EX-CELL-O

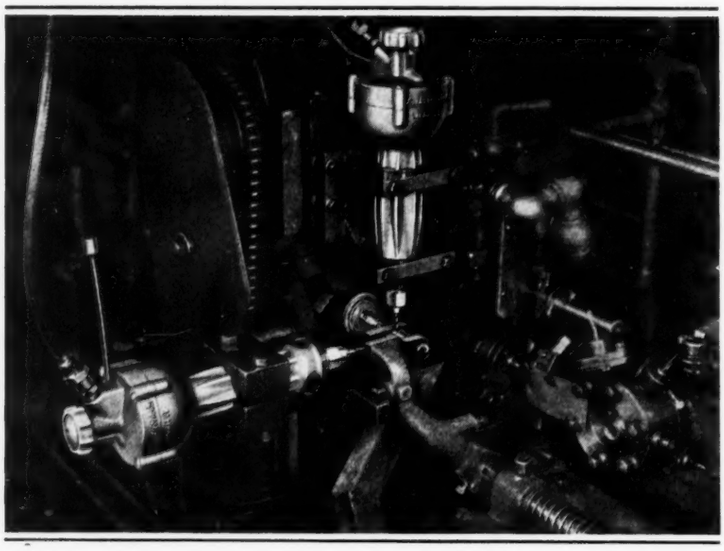
DRILL JIG BUSHINGS. GRINDING SPINDLES. HYDRAULIC POWER UNITS. PRECISION BORING AND FACING MACHINES. PRECISION THREAD GRINDERS. COUNTERBORES. BROACHES. CARBIDE TOOL GRINDERS. CARBOLOY TIPPED TOOLS. SPECIAL HIGH PRODUCTION MACHINES. GROUND FORM TOOLS. PRECISION PARTS. MILLING CUTTERS

EX-CELL-O CORPORATION, 1212 Oakman Blvd., Detroit, Mich.
Please send me, without obligation, further information on Precision Thread Grinders (Also, on the products I have checked at the left).
Name _____ Title _____
Company _____
Address _____

Cross-Drilling with Air Grinders in Automatic Screw Machines

By JOHN A. FEITEN, Chief Tool Designer
Detroit Lubricator Co., Detroit, Mich.

A satisfactory method of drilling cross-holes in parts being produced in automatic screw machines has been devised by using Madison-Kipp air grinders. The accompanying illustration shows such an operation; in this case, three holes are being drilled in a part. The piece is picked up by the transfer arm as it is cut off the bar and transferred to a drill jig that is mounted on the body of a special bracket.



Three Kipp Air Grinders are Mounted on This Automatic Screw Machine for Drilling Holes in Small Parts Formed in the Machine

Kipp air grinders are mounted in the vertical and back positions in slides that are carried on the special bracket. These slides are actuated by a cam driven by a roller chain, which, in turn, is connected to the camshaft of the machine by pinions. Holes of 1/16 inch and No. 60 size are drilled by these air-driven tools in 1.26 seconds. The drills recede at the end of the operation and then are moved forward again to remove burrs.

A third Kipp grinder is mounted on the left-hand side of the machine, as shown, for drilling a 5/64-inch hole, this grinder being held on a bracket attached to the cross-slide of the machine. The hole is drilled as the cross-slide moves forward for forming the next piece.

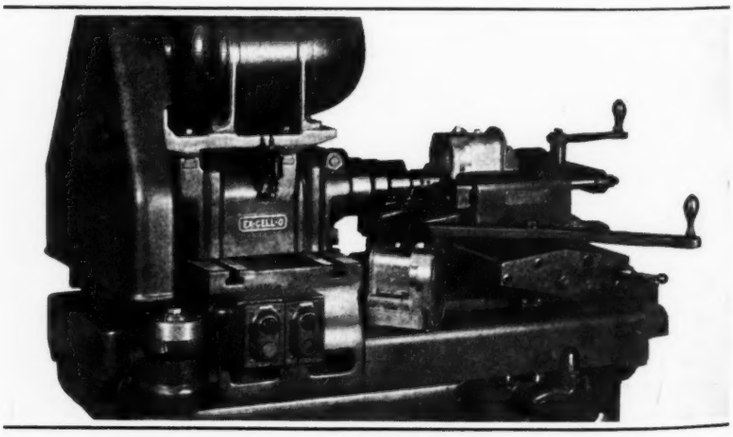
An important advantage derived from the use of air grinders in operations of this sort is that the grinders are not affected by the splashing of oil. Because starting and stopping of the machine spindle are effected almost instantaneously and the time required for drilling is in most cases only a second or less, large savings can be made by doing the cross-drilling in this manner instead of in a second operation. On the job shown no extra time is required, and the gross production is 800 pieces an hour. Regular shop air pressure of from 60 to 80 pounds per square inch is used, the air being filtered through a 150-mesh strainer.

The stand-pipe shown at the inlet connection of the grinders is provided for lubricating the bearings. In lubricating the grinder spindle, the air supply is closed and the tube filled with oil, after which the cap is screwed on the end of the tube and the air turned on. A short time elapses before the air motor will run smoothly, due to the excess oil in the ports. This procedure is followed about twice daily.

* * *

Aircraft Production Meeting

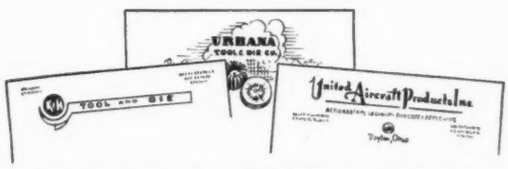
A National Aircraft Production Meeting of the Society of Automotive Engineers was held at the Ambassador Hotel, Los Angeles, Calif., October 13 to 15. At this meeting, more than a dozen papers were read relating to various phases of aircraft production — materials, inspection, design, and safety engineering as applied to aircraft and its operation.



Ex-Cell-O Two-station, Two-spindle, Precision Boring Machine with a Special Hand Indexing Fixture Used by the Edison Splitdorf Corporation to Completely Finish-machine Magneto Housings at the Rate of One Case Every Two Minutes, Boring Three Diameters of the Aluminum Case and Facing the End, as well as Finish-boring the Cast-iron and Steel Laminations

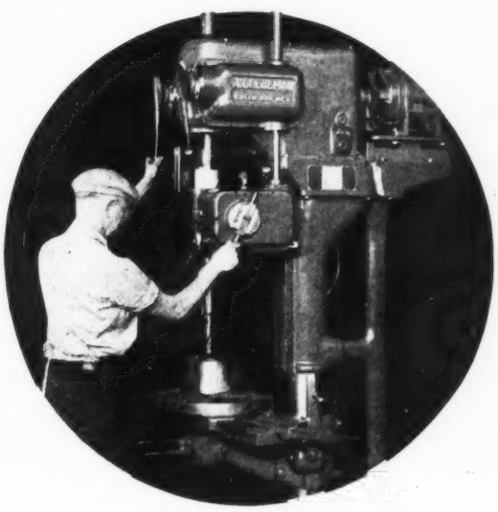
"PAID FOR ITSELF IN 9 MONTHS,"

SAYS A NATIONALLY KNOWN MANUFACTURER OF SPECIAL MACHINERY.



OTHER USERS OF CLEEREMAN DRILLING MACHINES AND JIG BORERS WRITE:

- **"A Time Saver"**
- **"Rapid and Accurate"**
- **"Convenient to Operate"**
- **"Pleased with Performance"**
- **"A Good Investment for Any Tool Manufacturer"**



CLEEREMAN DRILLING MACHINES

Round or square columns . . . fully geared . . . anti-friction . . . automatic oiling . . . single lever control for feed . . . single lever control for speeds . . . reversing motor, no friction clutches . . . standard range, 21" to 30" sizes . . . Capacity 1 1/2" thru S.A.E. 1035 steel.

CLEEREMAN JIG BORERS

Precision built for jig, fixture, tool and die work. Especially adapted to manufacturing where unusual accuracy is required. Also for experimental work and short run production. They handle drilling, boring, reaming, tapping and light milling.

NEWS OF THE INDUSTRY

Illinois

CHICAGO BELTING CO., 113-125 N. Green St., Chicago, Ill., announces that the company now marks all double belts made with what is believed to be the first permanent branding ever devised for double leather belts. This marking makes it possible for the user to order a new belt that is exactly like the old one. The name is printed on the inside of the belt, as the double belt goes through the tension cementing machine.

NICHOLAS FODOR has become vice-president in charge of engineering of the Diesel Equipment Corporation, 4401 N. Ravenswood Ave., Chicago, Ill., designer and manufacturer of Deco fuel injection equipment. For the last four years, Mr. Fodor has been connected with the Allis-Chalmers Mfg. Co. in Milwaukee, as engineer in charge of oil engine development.

L. H. GILMER CO., Tacony, Philadelphia, Pa., manufacturer of V-type and "Kable Kord" flat belting, announces that the Chicago factory branch has been removed from 665 W. Washington Blvd. to 351-363 E. Ohio St. A. B. MACFARLAND, for five years assistant to the sales manager of the company, will have charge of the new branch.

WALTER E. MARBLE, who has been associated with the D. A. Stuart Oil Co., Chicago, Ill., for forty-seven years in the capacity of salesman, was given a testimonial dinner at the Graemere Hotel in Chicago on September 28 by a group of friends and business associates in honor of his eightieth birthday. Mr. Marble is still active in his work.

O. M. GIBSON, formerly metallurgist with the Dodge Bros. Corporation, Detroit, Mich., has been appointed research director of G. S. Rogers & Co., 228 N. LaSalle St., Chicago, Ill., manufacturers of processing materials used in the heat-treatment and finishing of steel machine and automotive parts.

INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill., has licensed the CARNEGIE-ILLINOIS STEEL CORPORATION, of Chicago and Pittsburgh, to produce its new lead-bearing steels known by the trade name of "Ledloy."

AVERY PHILLIS has been appointed district manager of the midwestern sales territory for Beaver Pipe Tools, Inc., Warren, Ohio, succeeding W. S. ANDREWS. Mr. Phillis' headquarters will be in Chicago, Ill.

TRACE & WARNER, industrial designers, are now in their new office at 155 N. Clark St., Chicago, Ill., Room 1210.

Michigan

W. K. YOUNG has joined the Eclipse Counterbore Co., Detroit, Mich., as manager of the company's newly created boring-bar division. Mr. Young was connected for several years with the production division of Barber-Colman Co., Rockford, Ill., and later was assistant general manager of the Davis Boring Tool Co., St. Louis, Mo. For the last five years, he has specialized in developing a line of micrometer adjusting self-locking boring, reaming, and recessing tools having broad application in high-production work, as well as in job shops.

KIRKE W. CONNOR, president of the Micromatic Hone Corporation, Detroit, Mich., sailed October 6 on the *Queen Mary* for a European trip. Mr. Connor has been invited to address several engineering societies abroad on methods of surface finishing in the aircraft, automobile, and ordnance manufacturing industries. He plans to visit England, France, Holland, Germany, Sweden, and Russia, and will return in about six or eight weeks.

PAUL W. RHAME has been made general manufacturing manager of the AC Spark Plug Division of General Motors Corporation, Flint, Mich., and JOSEPH A. ANDERSON assistant general manufacturing manager. EDWARD D. ROLLERT, has been appointed process engineer.

Missouri and Texas

W. STUART SYMINGTON has been elected president and general manager of the Emerson Electric Mfg. Co., St. Louis, Mo., succeeding JOSEPH NEWMAN, who will continue as chairman of the board.

RALEIGH HORTENSTINE has been elected president of the Wyatt Metal & Boiler Works, Houston and Dallas, Tex., to succeed the late W. J. Wyatt, founder of the company. Mr. Hortenstine has been vice-president and general manager, as well as a director of the company, since 1923.

New England

EDWIN R. RATH, consulting engineer, has joined the Power Transmission Council, Inc., with headquarters in Boston, Mass., as senior engineer. Mr. Rath was appointed head of the Department of Industrial Research of the New Hampshire State University in 1932, serving as a consulting engineer for all manufacturing firms within the state. He will continue his consulting work on a national scale.

MID-WEST PRODUCTION ENGINEERING CO., INC., 1401 E. Milwaukee St., Detroit, Mich., has appointed FRANK L. PEABODY sales agent for the company in the northern New England states.

New York

ADOLPH BREGMAN, metallurgical engineer, since 1919 managing editor of *Metal Industry*, severed his connection with that journal on October 1 and has established an office at 123 William St., New York City, as a consultant in the metal products manufacturing and metal finishing industries. He will specialize on industrial problems, development of products and industrial markets, a field in which he has been engaged for a number of years. He has been executive secretary of the Masters' Electroplating Association of New York since 1934 and will retain that position. Mr. Bregman is the author of a number of technical and industrial articles. He is a member of the Institute of Metals Division, A.I.M.E. and the American Society for Testing Metals.

THOMAS PROSSER & SON, 120 Wall St., New York City, dealers in alloy steels and machinery, have been appointed by DAVID BROWN & SONS, LTD., of Huddersfield, England, exclusive distributors in the United States for "Radicon" worm-gear reducers. WILFRED DUXBURY, who has been in charge of the gear department of David Brown & Sons in England, has joined the staff of Thomas Prosser & Son.

CLAYTON S. COGGESHALL has been appointed manager of the Turbine Division, Central Station Department, of the General Electric Co., Schenectady, N. Y., succeeding the late Robert D. Beale.

SILENT HOIST WINCH & CRANE CO. announces its removal from 762 Henry St., Brooklyn, N. Y., to 841-865 Sixty-third St.

Pennsylvania and Ohio

PIONEER ENGINEERING & MFG. CO., INC., 31 Melbourne Ave., Detroit, Mich., manufacturer of coolant and lubricant pumps, announces the appointment of the HARRIS PUMP & SUPPLY CO., 320 Boulevard of the Allies, Pittsburgh, Pa., exclusive representative of the company in the western part of the state of Pennsylvania and the northern part of the state of West Virginia.

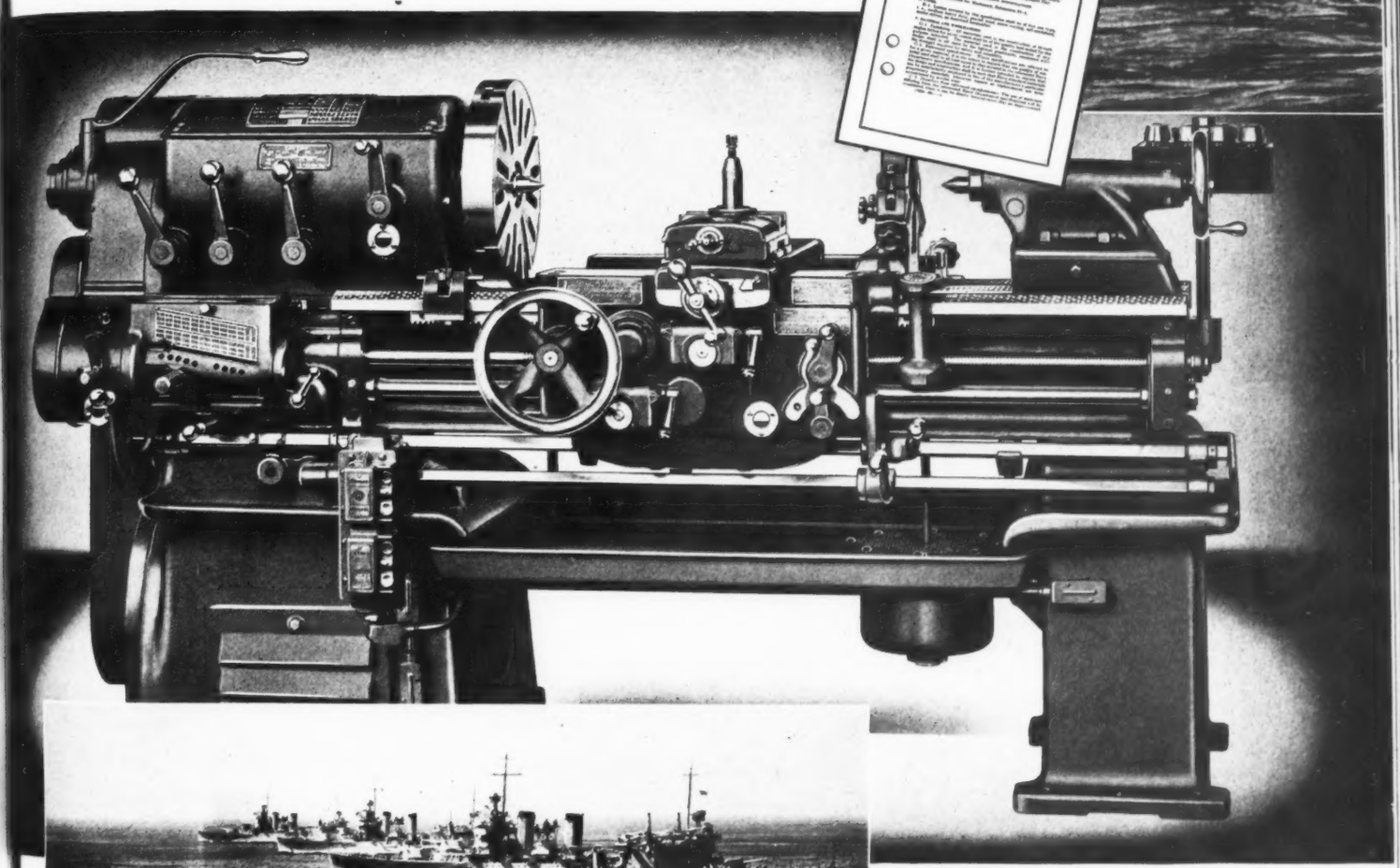
WILLIAM H. GIBB, of the Thomson-Gibb Electric Welding Co., Lynn, Mass., has established offices at 101 N. 33rd St., Philadelphia, Pa., from which he will

REED-PRENTICE

MODEL "B" 14" and 16" ★ LATHES ★

Now Serving the U. S. Navy on

Submarines—Destroyers—Cruisers—Carriers
Battleships—Gunboats—Repair Ships, Etc.



The exacting lathe work demanded by the Navy—and by the Shipbuilding industry—is delivered with minimum overhead and maximum efficiency by **Reed-Prentice Lathes,** Model "B"—14" and 16". These are both stock machine tools, built to exactly meet the rigid Navy Department Specifications **"40L1—Lathes, Engine, Motor-Driven, Medium-Heavy-Duty, 14" (Shipboard Use)** dated January 3, 1938"—and **"40L3—Lathes, Engine, Motor-Driven, Medium-Heavy-Duty, 16" (Shipboard Use)** dated February 1, 1938".

Reed-Prentice lathes are built in:

Engine and toolroom types.
With 8 or 16 spindle speeds (adapted for high spindle speeds for use with Tungsten Carbide Tools).
With 49 changes of feeds and threads.
With forced feed lubrication of headstock, apron, bed and carriage ways.
With standard key drive taper spindle nose as shown right.
With anti-friction construction of headstock (four bearing precision TIMKEN spindle mounting), end works, quick change, apron, etc.

Toolroom lathes are built with leadscrew reverse mechanism and other toolroom equipment.
Send for bulletins on Reed-Prentice Lathes available in 14", 16" and 20" sizes.

REED-PRENTICE CORP.
MACHINE TOOLS
WORCESTER MASS. U.S.A.

New York Office: 75 West Street

STANDARD KEY DRIVE TAPER SPINDLE NOSE STANDARD EQUIPMENT

Features:

1. Greater accuracy
2. Longer life
3. Low inventory of chucks
4. Labor saving
5. Simple mounting
6. Easy to clean
7. Less overhang
8. Utmost safety

serve the Philadelphia territory, including eastern Pennsylvania, southern New Jersey, Delaware, Maryland, and Virginia.

JAMES R. WEAVER, director of equipment, inspection, and test for the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will, in addition to his present duties, be responsible for negotiating and purchasing capital account equipment. Mr. Weaver has been connected with the company in various capacities since 1915.

James R. Weaver, Now Responsible for Equipment Negotiations for Westinghouse Electric & Mfg. Co.

WILLIAM SELLERS & CO., INC., Philadelphia, Pa., manufacturers of machine tools, have engaged CLARKE-HARRISON, INC., management engineers, to take charge of all the company's operations. This includes research, design, engineering, manufacturing, and sales.

C. N. KIRKPATRICK, secretary and sales manager of the Landis Machine Co., Inc., Waynesboro, Pa., manufacturer of thread-cutting equipment, sailed October 8 to visit the company's representatives in England and on the Continent.

YALE D. HILLS has been made manager of distributor sales for the Service-Sales Division of the Timken Roller Bearing Co., Canton, Ohio. For several years he has been manager of the Los Angeles branch of the company. Mr. Hills' new headquarters will be at the main Timken factory in Canton.

Wisconsin

FRED B. GARDNER has been elected acting treasurer of the Chain Belt Co., Milwaukee, Wis., to fill the vacancy created by the recent death of C. L. Pfeifer. JOHN T. BROWN, vice-president of the company, has been elected a member of the board of directors.

OBITUARIES

Frank B. MacMillin

Frank B. MacMillin, president of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, died on September 8 at the age of sixty-nine. Mr. MacMillin was born in Mount Gilead on November 30, 1868. His career was typical of that of many American business leaders who owe their success to combined thrift, ambition, and hard work. He started to work during his summer vacation in a local brickyard at the age of eight years, receiving a wage of 10 cents a day. After a wide variety of experience in the business world, he became associated in 1902, at the age of thirty-four, with the Hydraulic Press Mfg. Co. in the capacity of special auditor, and advanced through various managerial positions until he reached the presidency in 1935. Under his guidance, the company progressed from a small manufacturer of fruit presses to one of the largest and best-known manufacturers of all types of hydraulic presses.

Frank B. MacMillin

Mr. MacMillin took a leading part in the civic and religious activities of his community, and held many important posts. In his passing, his employes feel that they have lost not only a leader but a friend.

JOHN R. GRIFFITH, of the Norton Co.'s electric furnace plant at Chippawa, Ontario, Canada, died September 6 at the age of fifty-six years. He graduated as a metallurgical engineer from the Colorado School of Mines and joined the Norton Co. at Worcester, Mass., in 1911. Shortly afterward, he was transferred to Niagara Falls.

COMING EVENTS

NOVEMBER 11-19 — NATIONAL AUTOMOBILE SHOW at Grand Central Palace, New York City, under the auspices of the Automobile Manufacturers Association, 366 Madison Ave., New York City.

NOVEMBER 14-16—National Transportation Engineering Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Commodore Hotel, New York City. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

DECEMBER 5-9—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Building, 29 W. 39th St., New York City. C. E. Davies, secretary, 29 W. 39th St., New York City.

DECEMBER 5-10—THIRTEENTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING at Grand Central Palace, New York City. For further information, address International Exposition Co., Grand Central Palace, New York.

DECEMBER 7-9—Annual convention of the NATIONAL ASSOCIATION OF MANUFACTURERS in New York City. For further information, address National Association of Manufacturers, 14 W. 49th St., New York City.

JANUARY 9-13, 1939—Annual meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at Detroit, Mich. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

FEBRUARY 23-25, 1939—Spring meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at St. Charles Hotel, New Orleans, La. C. E. Davies, secretary, 29 W. 39th St., New York City.

MARCH 13-18, 1939—Annual meeting and MACHINE AND TOOL PROGRESS EXPOSITION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS at Detroit, Mich. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

MAY 15-18, 1939—Annual convention of the AMERICAN FOUNDRYMEN'S ASSOCIATION in Cincinnati, Ohio. C. E. Hoyt, executive secretary, 222 W. Adams St., Chicago, Ill.

MAY 28-JUNE 8, 1939—WORLD AUTOMOTIVE ENGINEERING CONGRESS to be held in New York, Indianapolis, Detroit, and San Francisco under the auspices of the Society of Automotive Engineers.

JUNE 25-JULY 1, 1939—THIRTEENTH INTERNATIONAL CONGRESS OF CARBIDE, ACETYLENE, OXY-ACETYLENE WELDING AND ALLIED INDUSTRIES, to be held in Munich, Germany. For further information, address the International Acetylene Association, 30 E. 42nd St., New York City.

What a Union Official Has to Say About Unfair Taxation

In an article published in the *Greenwich Time*, Matthew Woll, vice-president of the American Federation of Labor, has this to say on the subject of unfair tax burdens placed on industry:

"There should be a complete revision of our tax laws. Taxes provide the greatest single contribution to the cost of living today. It makes no difference whether these taxes are paid in the first instance by big business, industry, the public utilities, the railroads, the banks, or the insurance companies, it is the ultimate consumer who pays them in the end.

"We must be sure that our method of levying taxes is not designed to favor any particular group. It is of utmost importance that we insure an equitable distribution of the cost of government, so as not to restrict unduly the production and equitable distribution of wealth in the interest of all. . . .

"There is abroad the general belief and conviction that the tax policy of the Government, coupled with its apparent attitude toward industry, is preventing the normal expansion of American industry. It is the common belief that undue and unjust taxes are keeping billions of dollars of idle capital lying in the banks of the country because capital is afraid to take excursions into new enterprises or to assist in the expansion of old ones. . . .

"It has been truly said that the power to tax is the power to destroy. Likewise, this power to tax may be used for constructive and beneficial purposes. Why not use the power to tax as a power to construct in such a way as to take the unemployed off the relief rolls and put the workers back into honest jobs where they would much prefer to be?

"In other words, would it not be well to stop penalizing business and industry for being successful in the past and reward them through the agency of the power to tax for returning to that success? This sounds like a paradox, but it can be done.

"Suppose the Government should say to industry something like this: Whenever and wherever you can show that you have spent capital, whether it be undivided profits, capital gains, or new capital invested or borrowed, for expansion of your business, the replacement of obsolete machinery, or in any other way which provides additional employment somewhere along the line of production and distribution, the Government will credit you on the basis of the depreciated amount on your tax bill.

"This procedure would seem highly desirable, not alone because of its incentive to greater employment of labor, but because of the vital need of lower selling prices as well. Then, too, it would encourage the capital goods industry that so frequently lags behind. Isn't it conceivable that industry would much prefer to employ this money in increased production than to turn it over to the Government to be used for relief work allocated altogether too often with an eye to political expediency?

"And the result? This same money which is being handed out in relief payments would go into pay envelopes every week-end—honest wages for an honest week's work. The wheels of industry would begin humming again, purchasing power would increase, thereby calling for more production, the national income would steadily increase, additions would be made to the national wealth, unemployment would rapidly decline and in a very short time the depression would be forgotten."

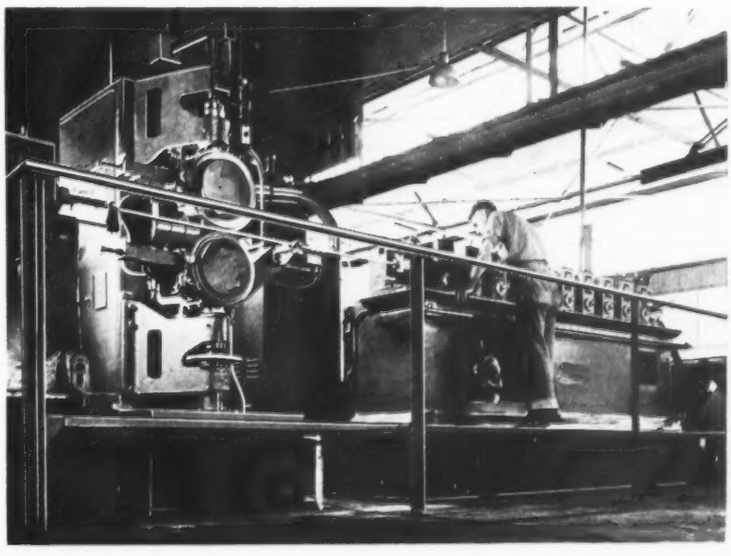
* * *

Exposition of Power and Mechanical Engineering

Not less than 270 exhibitors have reserved space at the well-known Power Show to be held December 5 to 10 on three floors of the Grand Central Palace, New York City. The exhibits will include power plant equipment, instruments and control equipment, electrical safety switches and switchboards, industrial testing machines, valves and valve control mechanisms, steam traps, pump governors, pressure gages, filters, etc. There will also be on exhibition equipment for coiling, bending, and other pipe forming operations, oil burners, refractory and insulating materials, and a full line of power transmission appliances and hoisting equipment.

* * *

When taxation destroys wealth, it also wipes out work and wages.—*The Houghton Line*



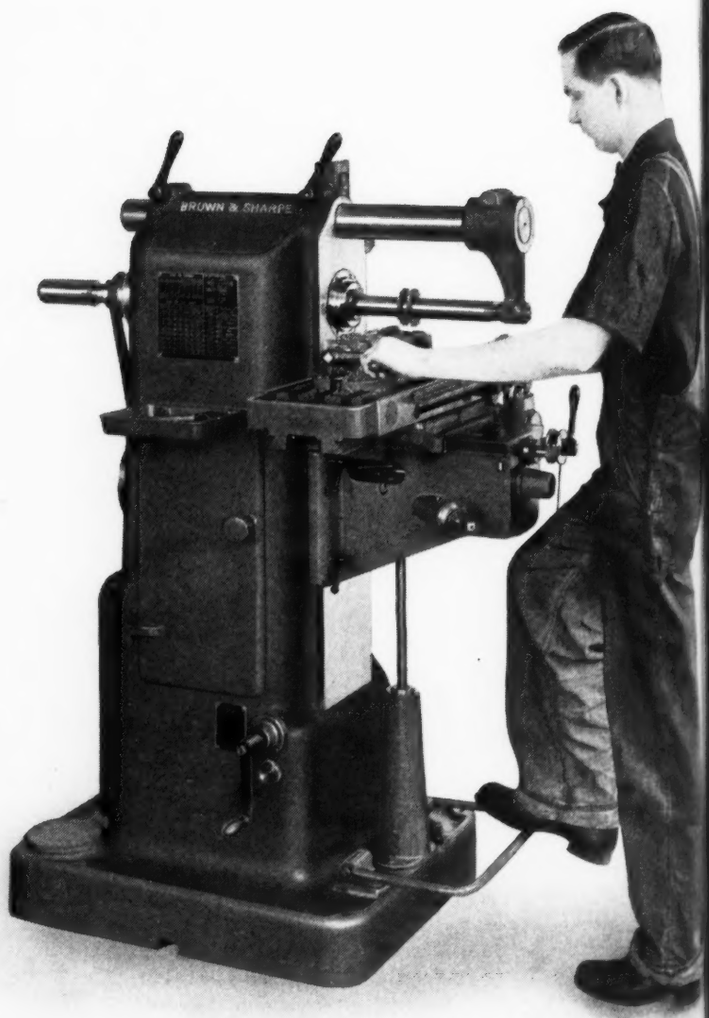
Automobile Body Hardware and Fittings for Eastern and Southern Assembly Parts of the General Motors Corporation will be Produced in the New Plant of the Ternstedt Trenton Division, which has Just been Placed in Operation. Completely New Equipment has been Provided Throughout This Plant, which has Approximately 900,000 Square Feet of Floor Space. The Illustration Shows One of Several Roll Forming Machines Installed for Producing a Variety of Formed Sections. The Particular Machine Shown Rolls and Welds the U-Shaped Steel Bows that Reinforce the One-piece Steel Roof of General Motors Automobiles

4 HIGH

. . . . each having Modern Features that give PROFITABLE PRODUCTION MILLING

000

Longitudinal Feed of Table—4″
Transverse Adjustment of Spindle—2″
Vertical Adjustment of Spindle Head—6″



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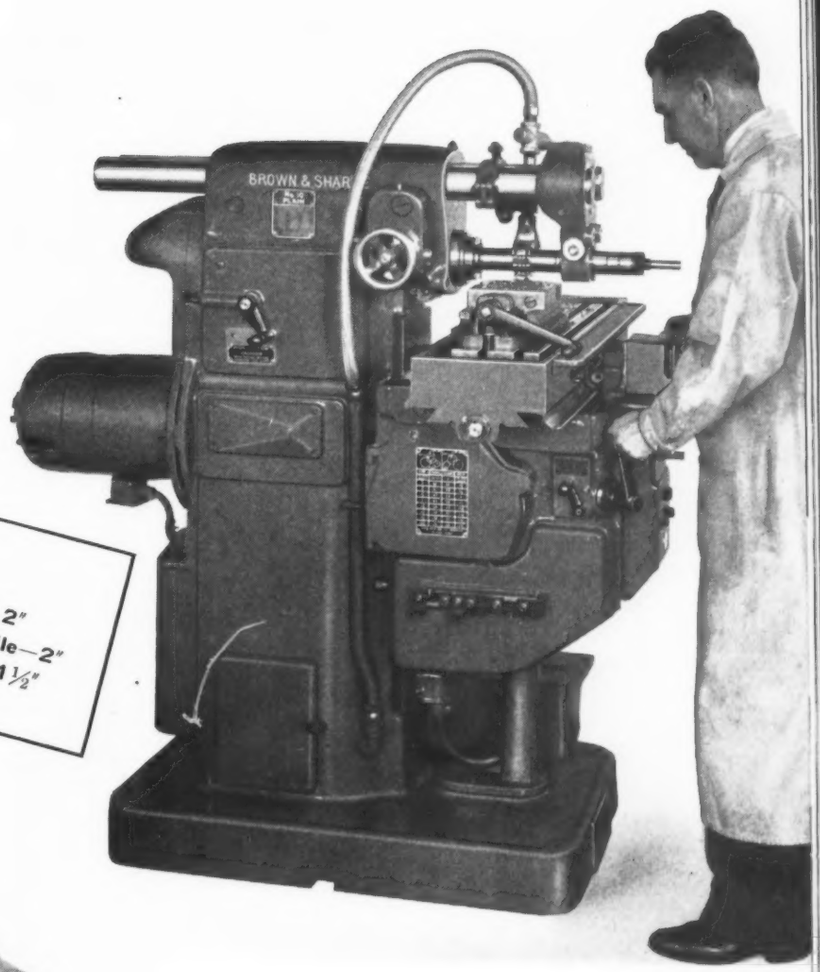
Longitudinal Feed of Table—12″
Transverse Adjustment—6″
Vertical Adjustment of Knee—15″

B·S

BROWN &

PRODUCTION MACHINES



10 ELECTRICALLY CONTROLLED
Longitudinal Feed of Table—*12″
Transverse Adjustment of Spindle—2″
Vertical Adjustment of Knee—11½″
*Longer Feed can be furnished

12 ELECTRICALLY CONTROLLED
Longitudinal Feed of Table—*18″
Transverse Adjustment of Spindle—3¼″
Vertical Adjustment of Spindle Head—6½″
*Longer Feed can be furnished

Ask for specifications of these COST-CUTTING Plain Milling Machines—000—OY—10—12

BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

SHARPE

NEWS OF THE INDUSTRY

California

QUIJADA TOOL CO., manufacturer of high-speed portable pipe machines, has recently moved from 5474 Alhambra Ave., Los Angeles, Calif., into its newly completed factory at 620 N. San Gabriel Boulevard, San Gabriel, Calif.

Canada

CARL L. LEAFE has been made superintendent of the Norton Co. of Canada, Ltd., Hamilton, Ont., Canada, succeeding ALBERT JOHNSON, who has been appointed consulting engineer for the Canadian plant. Mr. Leafe has been with the Norton Co. at Worcester, Mass., for about thirty years, in various production positions. The last few years he has been superintendent in Worcester of the division that includes products such as pulpstones, oilstones, non-slip flooring materials, and a number of specialty products.

Illinois

CRANE CO., Chicago, Ill., held open house November 8 to 10 at its enlarged laboratories at 42nd St. and S. Kedzie Ave. The staff of 255 people headed by Dr. L. W. Wallace, director of the laboratories, acted as host to the scientists, educators, research men, engineers, business executives, and others who had been invited to this "open house." The unusually complete laboratory equipment was demonstrated for the benefit of the visitors.

ARTHUR M. JOHNSON, of the Sundstrand Machine Tool Co., Rockford, Ill., and the American Broach & Machine Co., Ann Arbor, Mich., sailed Friday, November 18, on the *Queen Mary*, for an extended business tour of Europe, during which he expects to visit practically every European country. Mr. Johnson expects to stay in Europe four or five months, and, while there, also expects to visit the Leipzig Engineering Fair next March.

CENTRAL STATES INDUSTRIAL ENGINEERS, designers and builders of production machinery especially for the wire industry, have opened offices at DeKalb, Ill., with H. A. NELSON, E. K. HANSEN and L. F. PRIES as principal engineers. Mr. Nelson and Mr. Hansen have each had about twenty years experience in the woven wire industry, while Mr. Pries has been affiliated with many other manufacturing fields, as well, for several years.

H. C. BOARDMAN, research engineer for the Chicago Bridge & Iron Co., Chicago, Ill., has been elected president of the American Welding Society for the coming year. Mr. Boardman graduated from the University of Illinois in 1910 with a B. S. degree, and obtained his C. E. degree from the same university in 1926. He has been research engineer for the Chicago Bridge & Iron Co. for the last twelve years.

REED M. ANDRESS, vice-president and foreign manager of the Barnes Drill Co., Rockford, Ill., is spending two or three months in Europe, visiting the company's agents in Great Britain and on the Continent, including France, Italy, Switzerland, Belgium, Holland, and Sweden. Mr. Andress expects to return on the *Queen Mary* shortly before the holidays.

FOOTE BROS. GEAR & MACHINE CORPORATION, 5304 S. Western Blvd., Chicago, Ill., announces the appointment of the following representatives: MURRAY-BAKER-FREDERICK CO., 715 Linden Ave., Shreveport, La., for northern Louisiana and southern Arkansas; and Lloyd C. Taylor, P. O. Box 113, Richmond, Va., for the state of Virginia.

INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill., announces that the NORTHWESTERN STEEL & WIRE CO., Sterling, Ill., has been licensed to produce lead-bearing steels under the patents held by the Inland Steel Co.

CHAIN BELT CO., Milwaukee, Wis., has acquired the machinery and drawings for the complete line of screw conveyors and steel buckets made by the WELLER MFG. CO., 4425 W. Cortland St., Chicago, Ill. The manufacturing operations will continue in the Chicago plant.

PYRAMID METALS CO., manufacturer of decorative moldings, has moved from 455 N. Oakley Blvd., Chicago, Ill., to a new factory at 1335 N. Wells St., Chicago.

WILDER A. CHAPMAN has been appointed manager of laboratories for the Robert W. Hunt Co., 2200 Insurance Exchange, Chicago, Ill.

Michigan

TAFT-PEIRCE MFG. CO., Woonsocket, R. I., has appointed the JOHN E. LIVINGSTONE CO., exclusive sales representative in the state of Michigan, for the products of the company's small tool and gage division. Complete office and warehouse facilities are located at 7310 Woodward Ave., Detroit, where a complete line of Taft-Peirce gages, small tools, and magnetic chucks will be carried in stock. J. B. ROUSSEAU, Detroit district sales manager, will make his headquarters at the same address, where inquiries relating to Taft-Peirce contract service facilities, special machinery, and tooling will likewise be handled.

TOMKINS-JOHNSON CO., Jackson, Mich., announces that the patent on a safety remote control system recently granted to the late Harold A. Tomkins and L. A. Ward has been assigned to the company. This safety control system is designed for the operation of large presses or machines of any type that require several operators. It necessitates the use of all of the operators' hands in tripping the machine, thus preventing injury to any one of the operators.

W. A. HART, chief engineer of the Colonial Broach Co., Detroit, Mich., will address the American Society for Metals in Peoria, Ill., December 12 on recent developments in the broaching field. Slides of interesting new applications of broaching equipment in the manufacture of the products of numerous industries will accompany his talk. Mr. Hart also addressed the Rockford chapter of the American Society of Tool Engineers last month on the same subject.

WILLEY'S CARBIDE TOOL CO., 1342 W. Vernor Highway, Detroit, Mich., announces that patent No. 2,133,495 relating to a method of forming hard compact metals suitable for cutting tools, drawing dies, and molds has recently been issued to F. H. Willey, president of the company. Copies of the patent will be sent to anyone interested.

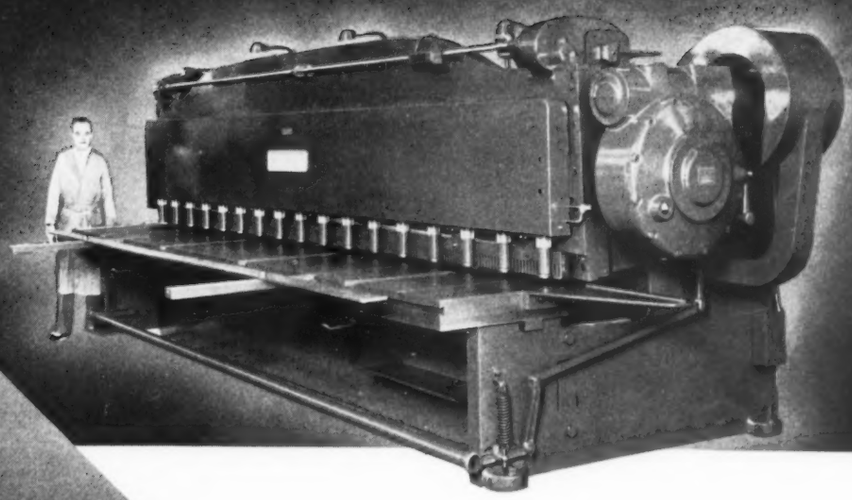
A. R. SOLTIS, who has been handling sales of U. S. Royalite and Vulcanite grinding wheels in the Detroit district for United States Rubber Products, Inc., 1790 Broadway, New York City, will include in his activities the Indianapolis and St. Louis districts. Mr. Soltis will continue to make his headquarters at Detroit, Mich.

DUANE E. STEINLE, who has been associated for the past year with the New Britain-Gridley Machine Division of the New Britain Machine Co. at New Britain, Conn., has been transferred to Detroit, Mich., where he will be connected with the sales engineering staff in that city.

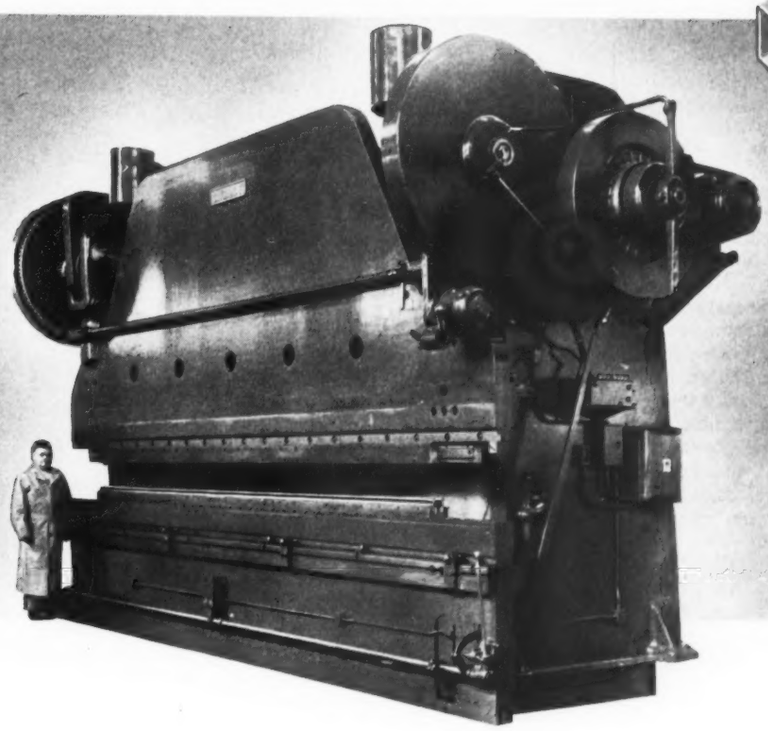
UNION CHAIN & MFG. CO., Sandusky, Ohio, has appointed C. E. PHILLIPS & CO., 2750 Poplar St., Detroit, Mich., exclusive sales representative and stock carrying distributor for the company in the Detroit territory.

New Jersey

MANHATTAN RUBBER MFG. DIVISION OF RAYBESTOS-MANHATTAN, INC., Passaic,



ACCURATE SHEARING ACCURATE FORMING

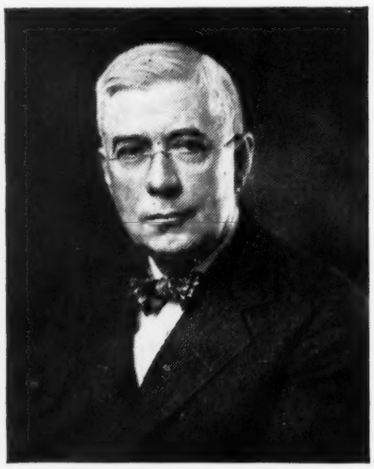


**Parts just naturally go together • • • • •
when sheared on a Cincinnati All-Steel
Shear • • • • • or formed on a Cincinnati
All-Steel Press Brake. • • • • • • • • • •**

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

N. J., celebrated on October 28 the forty-fifth anniversary of the founding and incorporation of the company, previously known as the Manhattan Rubber Mfg. Co. Frank Cazenove Jones, the first president of the company, retired in 1903, and was succeeded by Colonel Arthur F. Townsend, who served as president for twenty-six years, up to the merger in 1929, which formed Raybestos-



Colonel Arthur F. Townsend, Chairman of the Board of Raybestos-Manhattan, Inc.

Manhattan, Inc. Since 1929 Colonel Townsend has been chairman of the board of Raybestos-Manhattan, Inc. and general manager of the Manhattan Rubber Mfg. Division.

Three other early executives of the company are still active, namely; F. L. Curtis, assistant general manager of the Manhattan Division and treasurer of Raybestos-Manhattan, Inc., who was manager of the company's original factory office; C. T. Young, factory manager, who was assistant to Mr. Curtis; and Miss Margaret A. Hogan, secretary to Colonel Townsend, who was Colonel Townsend's secretary in the original main office in New York City, and the company's first office employe. Many of the employes have grown up with the company. Twenty-four, a few of whom are original employes, started work in the factory or office before 1900 and are still active. Nearly 200 have been in the employ of the company for more than twenty-five years.

In addition to being a leader in the industrial rubber goods industry, the company has also been an important factor in the automotive field, and is now one of the largest manufacturers of brake linings and clutch facings. The company now employs approximately 3000 persons in a plant covering 800,000 square feet of floor space, and has several auxiliary plants.

ECLIPSE AVIATION DIVISION OF THE BENDIX AVIATION CORPORATION recently moved into its new plant at Bendix, N. J., which affords enlarged manufacturing facilities.

New York

OAKITE PRODUCTS, INC., 22 Thames St., New York City, manufacturer of industrial cleaning materials and methods, is holding a number of technical conferences of its sales representatives in various parts of the country, the object of which is to keep users of Oakite products acquainted with new developments in industrial cleaning operations. One of these conferences was held in St. Louis, November 18 and 19, and another in Detroit, November 21 and 22. One conference is scheduled to be held at the Commodore Hotel in New York, December 2 and 3, and another at the Hotel Pennsylvania, New York, December 9 and 10. The conferences will be attended by some ninety Oakite representatives, in addition to members of the Oakite technical research department.

J. N. WALKER has been elected vice-president of the Oxweld Acetylene Co., a Unit of the Union Carbide & Carbon Corporation, New York City. Mr. Walker has been general sales manager of The Linde Air Products Co., also a Unit of the Union Carbide & Carbon Corporation.

DR. FRANK BALDWIN JEWETT, vice-president of the American Telephone & Telegraph Co., and president of the Bell Telephone Laboratories, has been awarded the John Fritz Gold Medal for 1939 for "vision and leadership in science, and for notable achievement in the furtherance of industrial research and development in communication." The John Fritz Medal is awarded annually for notable scientific or industrial achievement by a board composed of representatives of the four national engineering societies—the Civil, the Mining and Metallurgical, the Mechanical, and the Electrical Engineers. It constitutes the highest honor that can be awarded by these engineering societies.

F. L. LAQUE, of the Development and Research Division of the International Nickel Co., Inc., 67 Wall St., New York City, presented an illustrated talk before the New York chapter of the American Society for Metals November 14 on the subject of "Corrosion Processes and Corrosion Testing."

PETZ & RABOLD TOOL & DIE CO., 433 Avenue A, Rochester, N. Y., has recently broken ground for a new factory on North Clinton Ave., which, is expected to be ready for occupancy on January 1. The new building will be one story high, of steel and tile construction.

HENRY KURTZ, optical engineer of the Bausch & Lomb Optical Co., Rochester, N. Y., spoke November 15 before the New York-New Jersey chapter of the American Society of Tool Engineers at Newark, N. J., on optical contour measuring apparatus.

J. C. HODGE and C. R. SADLER of the Babcock & Wilcox Co., have been awarded the J. F. Lincoln Award of the American Welding Society as co-authors of a prize-winning treatise entitled "Weldability and Properties of Materials for Casing Pipe."

T. D. CARTLEDGE, formerly assistant general sales manager, has been appointed general sales manager of The Linde Air Products Co., 30 E. 42nd St., New York City.

BELNAP & THOMPSON, INC., 309 W. Jackson Blvd., Chicago, Ill., sales promotion directors, have opened an office in the Graybar Bldg., New York City, with MARTIN W. BAZNER in charge.

Ohio

HOWARD F. MACMILLIN was elected president of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, at a recent meeting of the board of directors, to succeed his father, F. B. MacMillin, who died recently. Howard F. MacMillin has been general manager of the company for the last two years, and will continue in that capacity. He has been associated with the company continuously since his graduation from the Massachusetts Institute of Technology in 1921, at which time he started work as sales engineer, becoming subsequently sales manager, director, vice-president, and general manager.

OWENS-CORNING FIBERGLAS CORPORATION, Toledo, Ohio, has been formed by the Owens-Illinois Glass Co., Toledo, Ohio, and the Corning Glass Works, Corning, N. Y., to manufacture a variety of products from fiber glass for electrical and heat insulation and for many other industrial purposes. AMORY HOUGHTON, president and director of the Corning Glass Works, will be chairman of the board of the new corporation, and HAROLD BOESCHENSTEIN, a director of the Owens-Illinois Glass Co., will be president.

CHESTER H. GIBBONS, formerly stationed at the Eddystone, Pa., plant of the Baldwin-Southwark Corporation, has been transferred to the Ohio district in charge of the sales of products of the Southwark Division. Mr. Gibbons succeeds A. Q. DAVIS, who was recently appointed shop superintendent of the Baldwin-Southwark Corporation.

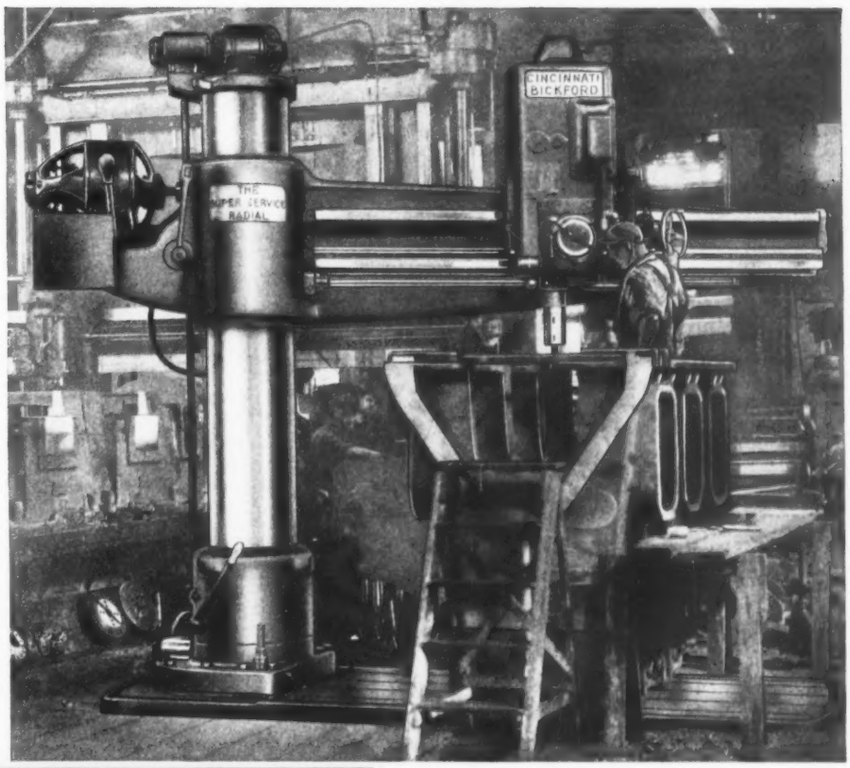
HENRY R. HANSON has joined the sales organization of William K. Stamets, machine tool dealer, of Pittsburgh, Pa. Mr. Hanson's headquarters will be at the Cleveland office of the company in the Rockefeller Building. He was formerly sales representative for the Latrobe Tool Co., in Ohio and Pennsylvania.

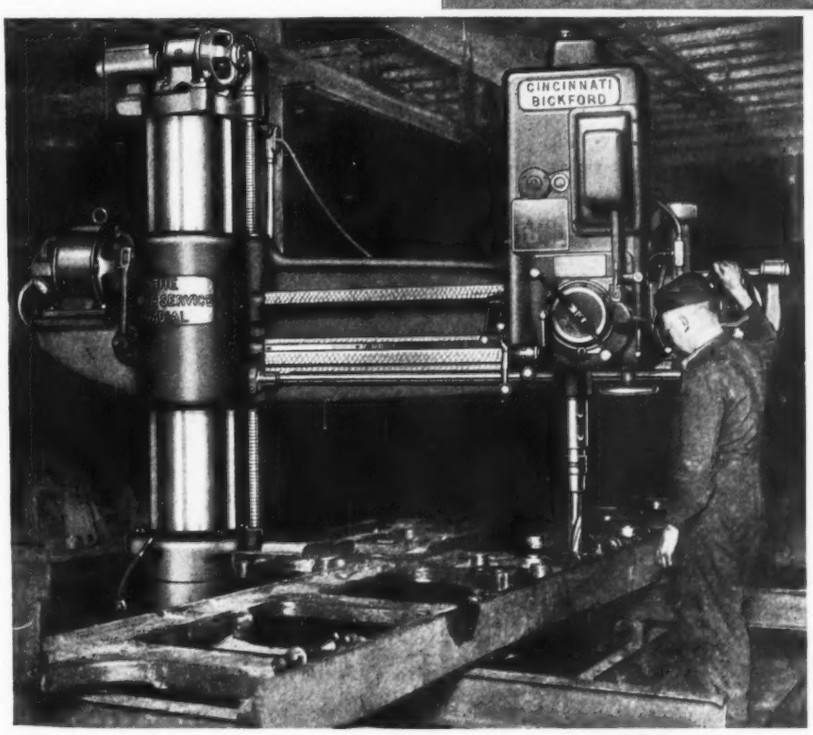
COLUMBIA MACHINE TOOL CO., Hamilton, Ohio, has acquired the plant of the Long & Allstatter Co., of Hamilton, and will continue to manufacture that

Convenient Low Controls—at the Head

ESSENTIAL FOR WORK LIKE THIS

ESPECIALLY on big work centralized control at the drilling position makes important savings. Controls for all speeds and feeds—electric column clamping — arm clamping and elevation to the arm — power rapid traverse—all controls for these and other operations of the SUPER SERVICE RADIAL DRILLS are always within easy reach from the drilling position. Think what time and energy would be wasted if that were not the case! Yet most of the radial drills in use today do not have this money saving feature of 100% centralized control at the head.





If your radial drills do not have this important feature, let us show you how a new SUPER SERVICE RADIAL will reduce your drilling costs by saving 30% or more . . and yield greater dividends than any other investment your company could make. This is a logical time to investigate the possibilities of new profits with

SUPER SERVICE RADIALS

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI, OHIO, U.S.A.

company's line of punches, shears, presses, press brakes, and similar metal-working equipment. Columbia heavy-duty shapers will also be built in the same plant.

Pennsylvania

J. W MEADOWCROFT, assistant works manager of the Edward G. Budd Mfg. Co., Philadelphia, Pa., has been awarded the Samuel Wylie Miller Memorial Award by the American Welding Society for his contributions to the advancement of the welding art. Mr. Meadowcroft has been a factor in the welding industry, not only in a managerial and executive capacity, but also as an inventor and as an author of important articles in the welding field. Some thirty United States patents and over fifty foreign patents have been issued to him, and he has contributed more than thirty papers to the proceedings of the American Welding Society.

HOWARTH PIVOTED BEARINGS CO., has recently been formed by H. A. S. Howarth and M. J. Howarth, with offices and factory at Ontario and 23rd Sts., Philadelphia, Pa., to manufacture a line of oil-film bearings of thrust and journal types suitable for use in hydro-electric units, steam turbines, and centrifugal pumps. These pivoted bearings are of improved Kingsbury and Mitchell types.

D. ROBERT YARNALL, chief engineer of the Yarnall-Waring Co., Philadelphia, Pa., has been re-elected president of the United Engineering Trustees, 29 W. 39th St., New York City, of which the Engineering Foundation is the research organization.

C. E. HERINGTON has been appointed director of publicity and advertising manager by the Meehanite Research Institute of America, Pittsburgh, Pa.

C. E. Herington, Director of Publicity and Advertising Manager of the Meehanite Research Institute

OBITUARIES

WALTER SHERMAN MOODY, a pioneer in transformer design connected with the General Electric Co., Schenectady, N. Y., from 1892 until 1927, when he was made consulting engineer of the company, died at his home in Pittsfield, Mass., on November 7, following an illness of several months. Mr. Moody retired from active work in 1931.

Mr. Moody was born in Chelsea, Mass., on September 20, 1864. He was graduated with the degree of electrical engineer from the Massachusetts Institute of Technology in 1887, after which he was instructor in physics and electrical engineering at that institute for one year. In 1888, Mr. Moody became assistant engineer of the Thomson Electric Welding Co., which position he held until 1892, when he joined the force of the Thomson-Houston Electric Co. at Lynn as designer of transformers and alternating-current dynamos. Upon the merger of that company with the General Electric Co. in 1892, he became chief engineer of the Lynn Works transformer department of the latter company. He was transferred to Schenectady in 1897, and in 1908 was placed in charge of transformer engineering for the entire company, with headquarters at Pittsfield.

KARL W. NELSON, sales manager of the plastics department of the General Electric Co., and formerly manager of the company's automotive products sales section, died suddenly in Pittsfield, Mass., on October 16, aged thirty-five years. Mr. Nelson joined the General Electric Co.'s cost department in Lynn, Mass., upon finishing school, and in 1924 was transferred to Bridgeport, first as a student salesman and then as the first sales specialist for the automotive products section. In 1929, he became assistant to the late Frank W. Hall, manager of the G-E construction materials division, and after performing administrative work for a year, became manager of the automotive products sales section, which position he held from 1930 until September, 1937, when he was appointed sales manager of the plastics department, with headquarters at Pittsfield.

HARVEY E. EATON, of the H. E. Eaton Co., died on October 25 at the Medical Center in New York City. Mr. Eaton was a native of Juniata County, Pa. Early in life, he became associated with the steel erection industry at the beginning of the all-steel car era, and later with ship fabrication. Some years ago he formed the H. E. Eaton Co., with offices in New York, Philadelphia, and Boston to represent the products of the Michigan Tool Corporation here and abroad. Visiting Russia at the beginning of its Five Year Plan, he did much in the coordination of machinery for fast production in the automotive and tractor divisions of the Soviet Government.

COMING EVENTS

DECEMBER 5-8—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Building, 29 W. 39th St., New York City. C. E. Davies, secretary, 29 W. 39th St., New York City.

DECEMBER 5-10—THIRTEENTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING at Grand Central Palace, New York City. For further information, address International Exposition Co., Grand Central Palace, New York.

DECEMBER 7-9—Annual convention of the NATIONAL ASSOCIATION OF MANUFACTURERS in New York City. For further information, address National Association of Manufacturers, 14 W. 49th St., New York City.

JANUARY 9-13—Annual meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at Detroit, Mich. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

FEBRUARY 23-25—Spring meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at St. Charles Hotel, New Orleans, La. C. E. Davies, secretary, 29 W. 39th St., New York City.

MARCH 8-10—Thirty-ninth convention of the INTERNATIONAL ACETYLENE ASSOCIATION at the Rice Hotel, Houston, Tex. For further information, address International Acetylene Association, 205 E. 42nd St., New York City.

MARCH 14-18—Annual meeting and MACHINERY AND TOOL PROGRESS EXPOSITION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS at Detroit, Mich. Executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

MAY 15-18—Annual convention of the AMERICAN FOUNDRYMEN'S ASSOCIATION in Cincinnati, Ohio. C. E. Hoyt, executive vice-president, 222 W. Adams St., Chicago, Ill.

MAY 28-JUNE 8—WORLD AUTOMOTIVE ENGINEERING CONGRESS to be held in New York, Indianapolis, Detroit, and San Francisco under the auspices of the Society of Automotive Engineers. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

FOR DRILLING, REAMING COUNTERSINKING AND SPOT FACING

with SINGLE TOOLS OR MULTIPLE HEADS

If your product requires drilling, reaming, countersinking or spotfacing, an Ex-Cell-O Hydraulic Power Unit can be used to drive and feed a single tool or a multiple spindle head more efficiently.

Mounted on a base with a work-holding fixture, the Unit can be set-up for a wide range of operating cycles. Rapid approach, two feed rates, jump feed, drill, rapid return and stop are controlled by adjustable dogs. With an attachment, jump or step-drilling can also be done. An electric motor on top of the Hydraulic Power Unit drives the hydraulic pump and, thru a train of pick-off gears, also drives the spindle.

Units operate horizontally, vertically or nose down at any angle between. They can be operated by manual or by remote control. Several Units can be mounted on the same base to perform in sequence or simultaneously, and operated by remote control.

You save money by incorporating Ex-Cell-O Hydraulic Power Units in the design of new special machinery, because they out-live the single purpose for which the machine was built. When you make changes in operations or models the Units, being standard, can be re-mounted on new or redesigned machines.

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EX-CELL-O CORPORATION, 1212 Oakman Blvd., Detroit, Mich.
Please send me, without obligation, complete information on Hydraulic Power Units and Special Machinery. (Also, on the products I have checked at the left).

Name ..... Title .....

Company .....

Address .....

NEW BOOKS AND PUBLICATIONS

MACRAE'S BLUE BOOK (1938-1939). 3604 pages, 8 1/2 by 11 inches. Published by MacRae's Blue Book Co., 18 E. Huron St., Chicago, Ill. Price, $15.

This is the forty-sixth annual edition of a well-known directory covering all types of manufactured products made in the United States. In the present edition, certain sections have been reset in modern, more legible type.

The book follows the same arrangement as previous editions, containing five main sections. The first section comprises an alphabetical list of manufacturers' names and addresses and the names of local distributors. The second section is the Finding List, or alphabetical list of products. The third and principal section contains a classified list of manufactured products, giving the names and addresses of the manufacturers in alphabetical order. This section covers 2568 pages.

The last two sections in the book are the trade facility section, containing a list of commercial bodies, banks, railroads, and warehouses, geographically arranged, and a trade name section covering the trade names of the products listed in the classified section. The great scope of this book makes it an invaluable aid to purchasing agents or others desiring to make lists for use either in buying or selling.

A.S.M.E. MECHANICAL CATALOG AND DIRECTORY (1939). 478 pages, 8 1/2 by 11 1/2 inches. Published by the American Society of Mechanical Engineers, 29 W. 39th St., New York.

This is the twenty-eighth annual volume of a book containing condensed catalogue data covering hundreds of items used by industry in manufacturing its products and in maintaining its plants. In the present edition, the title of the work has been changed from "Mechanical Catalog" to "A.S.M.E. Catalog and Directory," as the directory forms an important feature of the new edition. The directory contains a classified list of manufacturers of industrial equipment and materials, and includes not only the names of manufacturers whose catalogue data are presented in the book, but many other concerns serving the mechanical engineering field. The final section of the book comprises a list of trade names of products included in this volume.

STEEL CONSTRUCTION. By Henry Jackson Burt. Revised by C. H. Sandberg. 438 pages, 5 1/2 by 8 1/4 inches. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price, $3.50.

This is the fourth edition of a book covering the design of steel framework for buildings. The book deals especially with architectural structures, such as business buildings, office buildings, warehouses, mill buildings, residences, etc. The text has been thoroughly revised and enlarged to bring it up to date. The revision includes the latest specifications, and additional chapters have been written, such as those on welding and industrial buildings, to cover present steel building design more completely.

PRACTICAL DESIGNS FOR DRILLING AND MILLING TOOLS. By C. W. Hinman. 171 pages, 6 by 9 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City. Price, $2.50.

This is a reference book covering the principles underlying the drafting and designing of drilling jigs, gages, hand tools, and tapping and milling fixtures used in interchangeable manufacture. It avoids describing the tooling details of intricate designs, emphasizing rather principles that can be applied to an infinite number of designing problems. The book goes into shop mathematics in so far as is necessary for use in simple design, higher mathematics being avoided. The last chapter discusses heavy-duty drilling and milling fixtures in use.

TOOL STEEL SIMPLIFIED. By Frank R. Palmer. 315 pages, 6 by 9 inches. Published by the Carpenter Steel Co., Reading, Pa. Price, $1.

This is the second edition of a handbook on tool steel, containing definite information for the toolmaker on simplified methods of selecting and heat-treating steel for making any kind of steel. Toolmakers will find in this book the answer to many of their problems, such as how to stop tools from warping; how to make tools wear longer; how to prevent size change; etc.

TRADE STANDARDS FOR AIR COMPRESSORS. 109 pages, 8 1/2 by 11 inches. Published by the Compressed Air Institute, 90 West St., New York City. Price, $1.

This publication contains a list of the standards adopted by the Compressed Air Institute covering the terminology, rating, testing, installation, and care of all types of air compressors.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933,

of MACHINERY, published monthly at New York, N. Y., for October 1, 1938.

State of New York }
County of New York } ss.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared Edgar A. Becker, who having been duly sworn according to law, deposes and says that he is the treasurer of The Industrial Press, Publishers of MACHINERY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Industrial Press, 140-148 Lafayette St., New York; Editor, Erik Oberg, 140-148 Lafayette St., New York; Managing Editor, None; Business Managers, Robert B. Luchars, 140-148 Lafayette St., New York; Edgar A. Becker, 140-148 Lafayette St., New York; and Erik Oberg, 140-148 Lafayette St., New York.

2. That the owners of 1 per cent or more of the total amount of stock are: The Industrial Press, 140-148 Lafayette St., New York; Erik Oberg, 140-148 Lafayette St., New York; Robert B. Luchars, 140-148 Lafayette St., New York; Edgar A. Becker, 140-148 Lafayette St., New York; Laura A. Brownell, 140-148 Lafayette St., New York; Franklin D. Jones, 140-148 Lafayette St., New York; First National Bank & Trust Co. of Montclair and Robert B. Luchars, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Leigh Roy Urban, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Kenneth D. Ketchum, Trustees (Beneficiaries unknown), Upper Montclair, N. J.

3. That the known bondholders, mortgagees or other security holders are: Laura A. Brownell, 140-148 Lafayette St., New York; John Connolly, 140-148 Lafayette St., New York; Franklin D. Jones, 140-148 Lafayette St., New York; Robert B. Luchars, 140-148 Lafayette St., New York; Louis Pelletier, 140-148 Lafayette St., New York; Elizabeth Y. Urban, 163 Western Drive, Longmeadow, Mass.; Helen L. Ketchum, King St., Cohasset, Mass.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt., and Henry V. Oberg, 28 Spencer Ave., Lancaster, Pa.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder, or security holder, appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

EDGAR A. BECKER, Treasurer

Sworn to and subscribed before me this 21st day of September, 1938

CHARLES P. ABEL,
Notary Public, Kings County No. 302
(SEAL) Kings Register's No. 9126
New York County No. 197, New York Register's No. 9-A-147
(My commission expires March 30, 1939)

NEWS OF THE INDUSTRY

Illinois and Missouri

NEIL C. HURLEY, JR., was elected a vice-president of the Independent Pneumatic Tool Co., Chicago, Ill., at a recent meeting of the board of directors. Mr. Hurley has been secretary of the company for the last four years. He joined the company in 1932 upon graduation from the University of Notre Dame, and has been active in the direction of sales for the company's Electric Tool Division.

ERNST NIEDERER, formerly works manager of the Clearing Machine Corporation, Chicago, Ill., has been appointed

Ernst Niederer, New Works Manager of the Verson Allsteel Press Co.

works manager of the Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago. Mr. Niederer has been identified with the power press industry for many years.

RALPH A. TERRELL, formerly with the Boyar-Schultz Corporation of Chicago, Ill., and previously chief engineer of the Ingersoll Steel & Disc Co., Chicago, and of the South Bend Tool & Die Works, South Bend, Ind., has joined the sales organization of the Tool Equipment Sales Co., 24 S. Pulaski Road, Chicago.

RAY B. HOOVER has been elected president of Shafer Bearing Corporation, 35 E. Wacker Drive, Chicago, Ill., manufacturer of roller bearings. Mr. Hoover was formerly vice-president and general manager of the company.

ALLEN-BRADLEY CO., Milwaukee, Wis., manufacturer of electric motor controls, has opened a new sales office at 101 Broadway, Rockford, Ill. H. L. O'DONNELL, formerly of the Chicago office, has been placed in charge of this office.

RANSOME CONCRETE MACHINERY CO., Dunellen, N. J., builder of an adjustable welding work-table and positioner, has appointed the MACHINERY & WELDER CORPORATION, 1474 S. Vandeventer Ave., St. Louis, Mo., exclusive representative of the company in Illinois, Missouri, Kansas, and parts of Indiana, Iowa, Wisconsin, and Michigan.

Indiana

THE MILES AND JOHN J. O'BRIEN FELLOWSHIP IN METALLURGY AND ALLIED SCIENCES has been established at the University of Notre Dame by John J. O'Brien, president of the South Bend Lathe Works, South Bend, Ind. This fellowship will provide funds for the pursuit of post-graduate study and research by men who intend to devote themselves to teaching. Scholarship recipients, to be named annually, will be selected on the basis of proved ability, character, and financial need. Mr. O'Brien has always evidenced a keen interest in the promotion of research in the engineering field, an interest that was shared by his late brother, Miles.

E. E. LEVAN has been elected vice-president of the Haynes Stellite Co., a unit of the Union Carbide & Carbon Corporation. Mr. LeVan has been general sales manager, and is located at the company's general office and works at Kokomo, Ind.

New England

NORTON CO., Worcester, Mass., announces the following changes in the sales organization of its Abrasive Division: G. A. PARK, formerly assistant sales manager, has been appointed eastern sales manager in charge of the territory east of and including the Pittsburgh district. R. M. JOHNSON, formerly sales engineer, has been appointed western sales manager, and will have charge of the Cleveland, Detroit, and Chicago warehouses and other western territories. A. G. GREEN, of the Research Laboratories, will take over the position of sales engineer held by Mr. Johnson. W. R. MOORE, as the newly appointed general sales manager, will direct the activities of these three men. Mr. Moore will report to H. K. CLARK, vice-president. W. T. MONTAGUE has been appointed assistant vice-president. He will continue to supervise the staff activities of the sales department.

STERLING ELECTRIC MOTORS, INC., Los Angeles, Calif., manufacturers of Slo-Speed and Speed-Trol motors, have opened direct factory offices temporarily at 81 San Miguel St., Springfield, Mass. Allen A. Adams, treasurer and director of the company, will act as eastern manager.

W. ROY MOORE, for many years vice-president and secretary of the Billings & Spencer Co., Hartford, Conn., has been made director of sales of the Peck, Stow & Wilcox Co., Southington, Conn. WILLIAM O. SEIFERT, who has been manager of the machinery division of the latter company for many years, is now sales manager. ELMER J. MURRAY, formerly traveling representative of the tools and hardware division, has been made assistant sales manager. FLOYD J. NEAL, previously manager of the tools and hardware division, is now manager of production. The company also announces that the machinery and the tools and hardware divisions are being amalgamated.

FELLOWS GEAR SHAPER CO., Springfield, Vt., announces the removal of its Detroit office from 616 Fisher Building to larger quarters at 814 Fisher Building.

New York and New Jersey

H. FOLLETTE HODGKINS, president of the Rollway Bearing Co., Inc., Syracuse, N. Y., has taken over the duties of general manager previously handled by W. H. FLOAT, who recently resigned. No immediate successor to Mr. Float will be appointed. Mr. Hodgkins is also president of W. C. Lipe, Inc., of Syracuse.

J. S. VANICK, of the Development and Research Division of the International Nickel Co., Inc., 67 Wall St., New York City, presented an illustrated talk on "Modern Cast Irons," before the Washington, D. C., Chapter of the American Society for Metals, on January 9.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has opened a new branch office and warehouse in the Industrial Office Building, 1060 Broad St., Newark, N. J. The new office will be under the jurisdiction of the New York office, and will provide additional service in the Newark area for Allis-Chalmers motors, pumps, Texrope drives, power transmission units, and other equipment. C. A. PIHL has been appointed Newark branch office manager.

No. 12
Electrically Controlled

Left Hand Page —

Three jobs which are being "climb milled" advantageously on the No. 12.

Right Hand Page —

Upper — Roughing alloy-steel bevel gear on a No. 12 using automatic indexing fixture.

Lower — This combination of climb and conventional milling gives high production in slotting steel chuck bodies.

BROWN &

...all the Features for Profitable Production

-High Productive Capacity

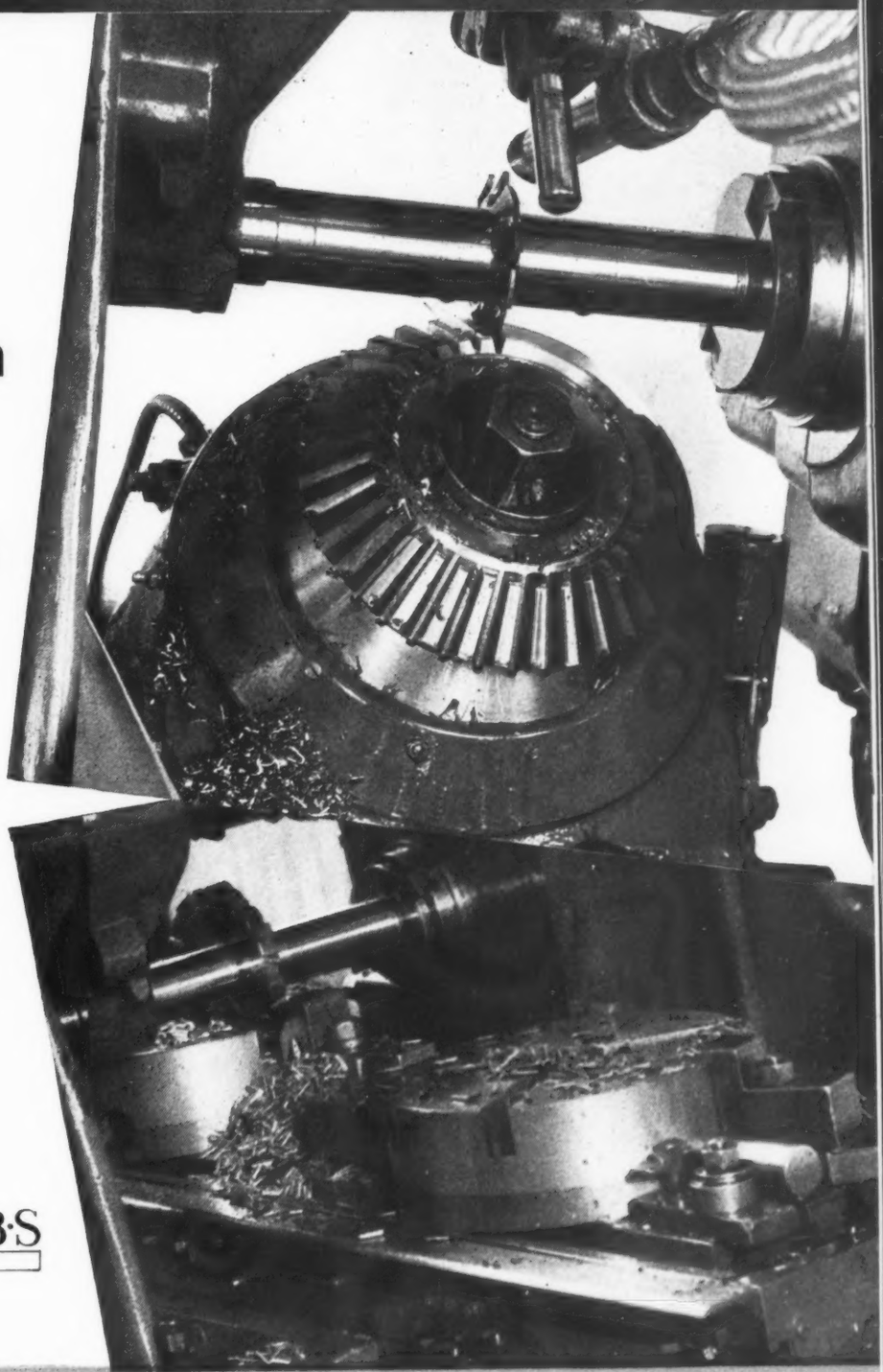
especially suited for climb milling

-Safety Protection

for both operator and machine

-Lasting Accuracy

through modern design and automatic lubrication



..... **A Pioneer** in Electrically Controlled milling machines—the No. 12 established the soundness of the Brown & Sharpe design in applying electrical controls to machine tools.

B·S

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

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Ohio

HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio, builder of the patented H-P-M Hydro-Power Fastraverse presses, has licensed the BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa., to use the H-P-M Fastraverse system of operation in connection with three presses for foreign shipment. This system of operation, which is the exclusive development of the Hydraulic Press Mfg. Co., is covered by more than one hundred United States and foreign patents.

KINLEY D. TRACY has been appointed assistant sales manager of the Baker Industrial Truck Division of the Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio. He has been associated with this company for the last five years, in charge of advertising and sales promotion. Previously, he was connected with the Auburn Automobile Co. in a sales and engineering capacity.

ACKLIN STAMPING CO., Toledo, Ohio, recently invited its employes and members of their families, as well as churchmen in the community and merchants in the vicinity of the plant—800 in all—to attend an open house in the plant one evening from 7 to 9 P.M., in order to obtain a first-hand knowledge of the work done in the plant.

FRANK E. GRAPER, who has been vice-president and works manager of the Acklin Stamping Co., Toledo, Ohio, has been appointed to the position of general manager. Mr. Graper still remains a vice-president of the company.

YOUNGSTOWN SHEET & TUBE CO., Youngstown, Ohio, has been licensed under the Ledloy patents of the Inland Steel Co., Chicago, Ill., to produce lead-bearing steel.

Pennsylvania

DR. HENRY H. GILMANN, of Brooklyn, N. Y., has joined the Research Staff of the Quaker Chemical Products Corporation, Conshohocken, Pa. For over five years Dr. Gilmann was chief chemist with the City Chemical Corporation of New York City, and for about a year was technical director of the Glyco Products Co., Inc., also of New York City.

MEEHANITE METAL CORPORATION, Pittsburgh, Pa., has recently granted a Meehanite production license to the FLEMING FOUNDRY CO., Springfield, Mass.

BETHLEHEM STEEL CO., Bethlehem, Pa., has taken out a license to make leaded steels under the patents of the Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

Wisconsin

E. W. SEEGER has been promoted from the position of assistant chief engineer of Cutler-Hammer, Inc., Milwaukee, Wis., to the position of chief engineer. P. B. HARWOOD, formerly general engineering supervisor, becomes assistant chief engineer in Mr. Seeger's place.

COMING EVENTS

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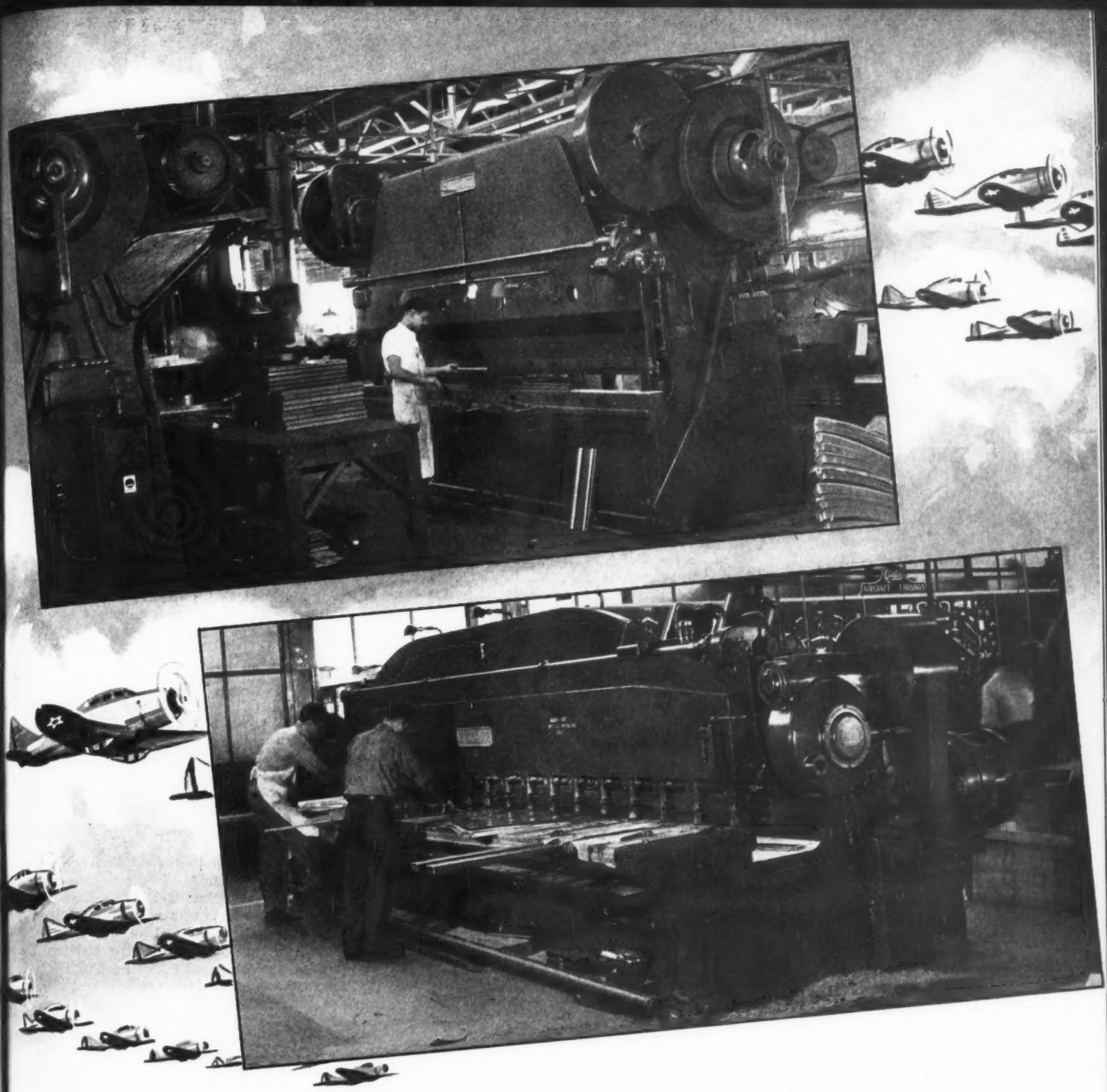
MARCH 5-13—LEIPZIG TRADE FAIR AND ENGINEERING EXHIBITION in Leipzig, Germany. For further information, address the Leipzig Trade Fair, Inc., 10 E. 40th St., New York City.

MARCH 8-10—Thirty-ninth convention of the INTERNATIONAL ACETYLENE ASSOCIATION at the Rice Hotel, Houston, Tex. For further information, address International Acetylene Association, 205 E. 42nd St., New York City.

MARCH 14-18 — Annual meeting and MACHINERY AND TOOL PROGRESS EXPOSITION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS at Detroit, Mich. Further information can be obtained from the executive secretary, Ford R. Lamb, 2567 W. Grand Blvd., Detroit, Mich.

MAY 15-18—Annual convention of the AMERICAN FOUNDRYMEN'S ASSOCIATION in Cincinnati, Ohio. C. E. Hoyt, executive vice-president, 222 W. Adams St., Chicago, Ill.

The Sebastian Lathe Co., Cincinnati, Ohio, and the group of its employes shown, have donated a 12-inch by 4-foot geared-head motor-driven lathe to Boys Town, Omaha, Neb. The Howell Electric Co., Howell, Mich., donated the motor, and the D. E. Whiton Machine Co., New London, Conn., donated two chucks. The Sebastian employes donated their time. This is the first metal-working machine installed at Boys Town. Up to the present time, there has been a woodworking shop, but no metal-working equipment.



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OBITUARIES

Arthur M. Mattison

Arthur M. Mattison, president of the Mattison Machine Works, Rockford, Ill., died at his home in Rockford on December 21, at the age of fifty-seven years. His death followed an illness that had confined him to his home for several months. Mr. Mattison was one of the leading manufacturers of Rockford, well known for the active part that he took in industrial and civic affairs for many years. He had been associated with the manufacturing company bearing his name for nearly forty years; and since 1920, when his father, Christen Mattison, founder of the company, died, had served as its president.

Arthur M. Mattison

Mr. Mattison was born in Minneapolis, Minn., in 1881. He lived for some time in Cedar Falls, Iowa, before moving with his family to Beloit, Wis., in 1895. In the following year, the Mattison company was founded by his father in Beloit. In 1898, he joined his father in the manufacture of woodworking machinery. The firm expanded rapidly, and in 1900, moved into a new factory. During the World War the Beloit plant was outgrown and the firm moved to Rockford, where its present factory building was erected. Almost since the start of the business, Mr. Mattison served it in an administrative capacity, having been president for the last eighteen years.

Mr. Mattison was a past-president of the Woodworking Machinery Manufacturers Association and a former director of the Machinery and Allied Products Institute. He was a past-president of the Associated Industries of Rockford and a member of the Rockford Manufacturers' and Shippers' Association before its merger with the Rockford Chamber of Commerce. In addition to his many industrial activities, he was a member of several civic and fraternal organizations. He served as a director of the Rockford Community Chest for six years, and was a past-president of the Rockford Rotary Club.

In the passing of Mr. Mattison, not only Rockford, but the machinery industry as a whole, has lost one of its valued leaders, whose influence was widely recognized in every endeavor in which he was engaged.

Robert Clough Danly

R. C. Danly, president of the Danly Machine Specialties, Inc., Chicago, Ill., died at his home in Hinsdale, Ill., on December 15 at the age of sixty-six. For the last forty-six years Mr. Danly was prominent in the manufacturing activities of Chicago. He was associated, in turn, with the Fanning Cycle Co., the Accurate Engineering Co., the International Harvester Co., and Ludwig & Ludwig. In 1923, he founded Danly Machine Specialties, Inc., and served continuously as president of the company until his death. Surviving him are five sons, three of whom, Philo H., George I., and Robert E., are active in the management of the company.

Robert Clough Danly

A. L. Valentine

A. L. Valentine, for many years superintendent of the Small Tool Division of the Pratt & Whitney Co., Hartford, Conn., and later manager of the Tool Manufacturing Division of the S K F Co. in Gothenburg, Sweden, died at his home in Wellesley Hills, Mass., January 3, at the age of sixty-four years. He had retired from active work about a year ago, when he returned to this country.

Mr. Valentine, who was well known to the readers of MACHINERY as the author of many articles pertaining to the small tool industry, and particularly to the manufacture of taps, was born in Sweden in 1875. At the age of eighteen, he came to the United States and served an apprenticeship with the Pratt & Whitney Co., where, in 1904, he became superintendent of the Small Tool Division, a position that he held until 1919, when he went to France for three years to build and start the operation of a small tool factory for a French company. In 1922, he returned to the United States, and shortly afterward was engaged by the S K F Co. in Sweden as manager of a new tap manufacturing plant. He held that position until late in 1937, when he retired and returned to the United States.

Mr. Valentine was known throughout the tap manufacturing industry, both in Europe and in this country, as a man who had an unusually detailed technical knowledge in his branch of the industry. He was a member of the American Society of Mechanical Engineers, the Société Ingenieurs Civils de France, and the Society of Engineers of Sweden.

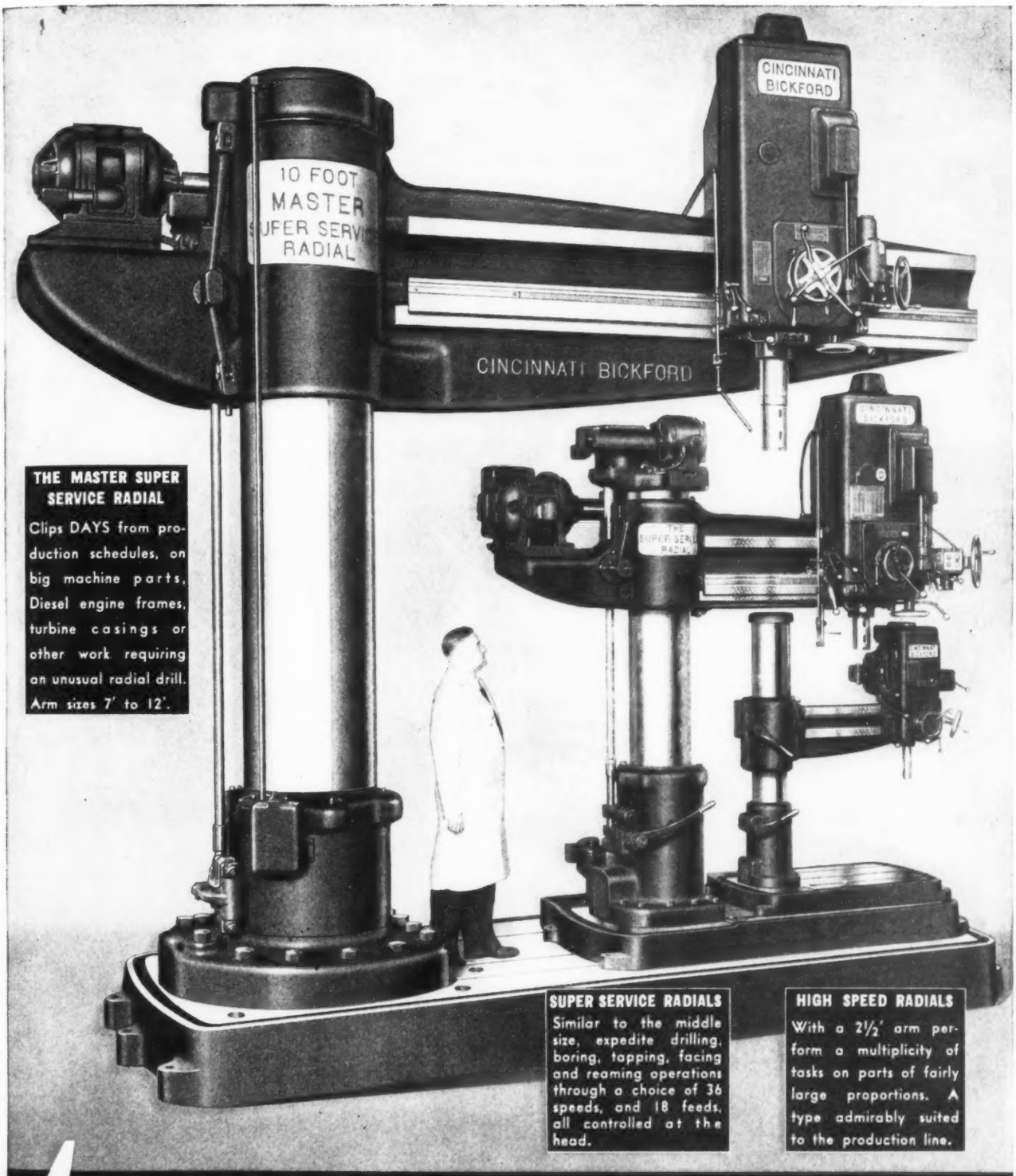
C. Wood Walter

C. Wood Walter, who was, until his retirement in 1925, for many years vice-president and director of the Cincinnati Milling Machine Co., died of pneumonia January 16 in Cincinnati at the age of seventy-two years. He graduated from Wooster College in 1888 with the degree of Bachelor of Arts. In 1900, after having spent some years in the publishing and newspaper field, he became connected with the Cincinnati Milling Machine Co., serving this company in various executive capacities until he retired.

Mr. Walter was also a very active member of the National Machine Tool Builders' Association, in which he held various offices. He was at one time vice-president and a director of this Association, as well as chairman of its Tariff Committee. He was also widely known for his many articles on trade and economic subjects which appeared in leading business papers.

Commenting editorially upon his passing, the *Cincinnati Enquirer* said: "To those who knew him, Wood Walter was one of the most lovable of men and one of the most intelligent. To those who only knew of him, he was a vigorous figure in the industrial life of Cincinnati and a singularly alert student of public affairs. Wood Walter will live in the memories of a multitude of Cincinnatians chiefly as a man of gracious personality, alert intelligence, and sober judgment."

MICHAEL RIESNER, consulting engineer for the Worthington Pump & Machinery Corporation, Harrison, N. J., and an authority in the field of air and gas compression, died suddenly at his home in Buffalo, N. Y., on December 12. Mr.



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Clips DAYS from production schedules, on big machine parts, Diesel engine frames, turbine casings or other work requiring an unusual radial drill. Arm sizes 7′ to 12′.

SUPER SERVICE RADIALS

Similar to the middle size, expedite drilling, boring, tapping, facing and reaming operations through a choice of 36 speeds, and 18 feeds, all controlled at the head.

HIGH SPEED RADIALS

With a 2½′ arm perform a multiplicity of tasks on parts of fairly large proportions. A type admirably suited to the production line.

A VERY LARGE.. and helpful.. FAMILY

Cincinnati Bickford's family portrait of three generic sizes illustrates the range of help afforded on drilling problems. The family includes many sizes of the Super-Service Radial Drill and a complete line of Upright Drills, all endowed with distinctive time-saving features.

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY, CINCINNATI, OHIO

Riesner had been a member of the Worthington organization since 1892, having served as chief engineer of its Cincinnati Works for twenty years. In that capacity, he was responsible for several outstanding developments in the line of compressors made by the company.

RUSSELL B. TEWKSBURY, chairman of the board of the Oster Mfg. Co., Cleveland, Ohio, died on January 1 at his winter home in Sarasota, Fla., aged seventy-nine years. Mr. Tewksbury was one of the founders of the Oster Mfg. Co., a concern established in 1893 to engage in the manufacture of pipe- and bolt-threading equipment. He assumed the presidency of the company in 1898, and held that position until five years ago, when his son, Roger G., succeeded him and he became chairman of the board. He was also a director of the Cleveland Tractor Co. and the Electric Railway Improvement Co. of Cleveland. Mr. Tewksbury had been a resident of Cleveland since 1880, when he graduated from Princeton University. He is survived by his wife, a daughter, and two sons.

Pratt & Whitney Men with Long Service Records

Pratt & Whitney, Division Niles-Bement-Pond Co., Hartford, Conn., inaugurated, on December 12, the awarding of service pins to employes who have been connected with the company for ten or more years. There are five pins in all—the ten-year pin is plain; the twenty-year pin carries one diamond; the thirty-year pin, two; and the forty-year pin, three diamonds. The fifty-year pin carries but one diamond, but it is much larger than those used in the other pins.

Pratt & Whitney employs 1800 people, and at the first award of these pins 794 were given out, a remarkably high percentage of men and women who have been with the company for long periods of years. There were 389 men who received ten-year pins; 272, twenty-year pins; 55, thirty-year pins; 27, forty-year pins; and four men were awarded the pin for fifty or more years of service. Forty-seven women also received pins; 33 in the ten-year class and 14 in the twenty-year group. Considering the comparatively small number of women employed by the company, these figures are noteworthy.

The four men who received fifty-year pins were Wilbur M. Gladding, with fifty-seven years of service; John F. Galvin, Sr., with fifty-three years of service; Henry C. Stevenson, with fifty-three years of service; and Flavel W. Woodworth, with seventy-one years of service.

NEW BOOKS AND PUBLICATIONS

PATTERNMAKING. By James Ritchey. Revised by Walter W. Monroe, Charles William Beese, and Philip Ray Hall. 233 pages, 5 1/2 by 8 1/4 inches. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price, $2.

This is a new edition of a handbook containing practical instructions for the patternmaker. The work has been carefully revised and brought up to date. Seventy-six pages have been added on the subject of metal patternmaking. The book describes the tools and equipment necessary for patternmaking, the construction of simple and complicated patterns, modern molding machines, and molding practice.

MECHANISM. By Robert McArdle Keown. Revised by Virgil Moring Faires. 282 pages, 6 by 9 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City. Price, $2.75.

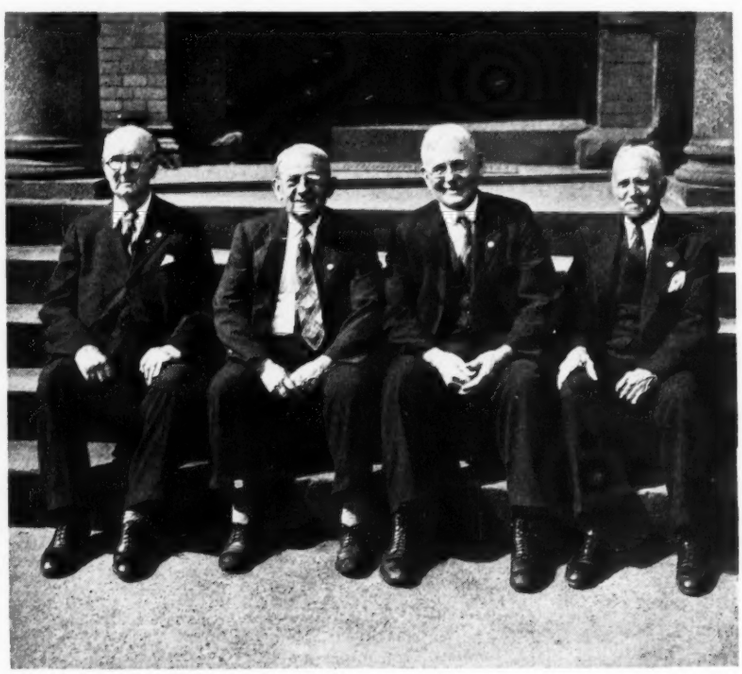
This is the fourth edition of a book on mechanisms that was first published in 1912. The book has been rewritten to cover new developments, and some new material has been added. The additional material includes a chapter on accelerations in mechanisms and discussions of non-circular rolling surfaces, block-and-tackle devices, the Gleason straight bevel teeth, the Geneva mechanism, and the universal joint. Many of the problems have been replaced with new ones.

MECHANICAL WORLD YEAR BOOK (1939). 360 pages, 4 by 6 inches. Published by Emmott & Co., Ltd., 31 King St., W., Manchester, England. Price 1/6.

This is the fifty-second year of publication of a little handbook for mechanical engineers. The present edition has been revised and contains some additional matter, including tabular information on the properties and treatment of alloyed metals, which have come into such widespread use in recent years.

FOUNDRY WORK. By William C. Stimpson and Burton L. Gray. Revised by John Grennan. 216 pages, 5 1/2 by 8 1/4 inches. Published by the American Technical Society, Chicago, Ill. Price, $2.

This is a revised edition of a practical handbook on standard foundry practice, including hand and machine molding. The book deals with typical molding problems, molding machines and equipment, casting operations, foundry materials, melting and pouring equipment, metallurgy of cast metals, etc.



Employes of Pratt & Whitney, Division Niles-Bement-Pond Co., Who have Received Service Pins for Fifty or More Years of Service with the Company. Reading from Left to Right, They are Wilbur M. Gladding, John F. Galvin, Sr., Henry C. Stevenson, and Flavel W. Woodworth

NEWS OF THE INDUSTRY

Michigan and Illinois

TAFT-PEIRCE MFG. CO., Woonsocket, R. I., and its Detroit representative, the JOHN E. LIVINGSTONE Co., have moved back to their former Detroit address at 2921 E. Grant Boulevard, where complete lines of Taft-Peirce gages, small tools, and magnetic chucks are carried in stock. J. B. ROUSSEAU, Detroit district sales manager of the Taft-Peirce Mfg. Co., will make his headquarters at the same address.

W. W. PEATTIE, president of the Northern Engineering Works, Detroit, Mich., was elected chairman of the Electric Hoist Manufacturers Association at the twenty-second annual meeting of the Association held on March 17. Mr. Peattie succeeds J. F. COOKE of the American Engineering Co. WILLIAM WHITE, secretary and general manager of the Euclid Crane & Hoist Co., Euclid, Ohio, was elected vice-chairman.

H. B. SPACKMAN, vice-president in charge of sales of Lyon Metal Products, Inc., Aurora, Ill., manufacturer of steel storage equipment, was made a director of the company at a recent meeting of the board of directors. Mr. Spackman has been connected with the company for the last two years.

New England

PRATT & WHITNEY, DIVISION NILES-BEMENT-POND CO., Hartford, Conn., is building a new plant designed exclusively for the manufacture of machine tools, small tools, gages, Keller machines, and special machinery. The new plant will comprise a one-story building almost 1000 feet long and 550 feet wide, a two-story administration building, a power house, and a two-story pattern shop. It will be located in Charter Oak Park, West Hartford, Conn.

HENRY JUDE has been appointed general sales manager of the Locomotive Equipment Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., to succeed C. H. BUTTERFIELD, who was recently made vice-president in charge of sales of the Industrial and Locomotive Divisions. Mr. Jude has been associated with the corporation for the last thirty-three years.

K. C. MONROE, chief engineer of the Lapointe Machine Tool Co., Hudson, Mass., addressed the Elmira Chapter of the American Society of Tool Engineers on the subject of "Developments in Broaching," at a recent meeting in Elmira. Mr. Monroe traced the history of this process of metal removal from its beginning to the present day, illustrating his talk with eighty slides and a short movie on broaching in England. A discussion of broaching problems followed the address.

AMERICAN SCREW CO., Providence, R. I., has recently licensed the following companies to manufacture the Phillips recessed-head screw; CHANDLER PRODUCTS Co., Euclid, Ohio; SCOVILL MFG. CO., Waterbury, Conn.; PHEOLL MFG. CO. of Chicago, Ill.; and LAMSON & SESSIONS Co. of Cleveland, Ohio.

New York and New Jersey

VICTOR BROOK, chief engineer and sales engineer of the High Speed Hammer Co., Inc., Rochester, N. Y., maker of riveting machinery and precision drilling machines, has resigned to become a manufacturers' representative in the up-state New York area. Among other exclusive lines, Mr. Brook will sell that of the High Speed Hammer Co., and will have his sales office at 433 Rockingham St., Rochester.

HALL PLANETARY CO., Fox St. and Abbotsford Ave., Philadelphia, Pa., manufacturer of precision thread milling and hole milling machines, announces the appointment of VICTOR BROOK, 433 Rockingham St., Rochester, N. Y., as exclusive representative of the company in the Rochester, Buffalo, and Jamestown, N. Y., area.

GREENE, TWEED & CO. has moved from its old quarters at 109 Duane St., New York City, which it has occupied for about thirty-three years, to a new and modern executive office at 101 Park Ave.

VASCOLOY-RAMET CORPORATION, North Chicago, Ill., has recently placed in operation a new plant for the manufacture of tantalum-carbide wire, tube, dies, and cutting tools and blanks. The new plant is located at 415-421 Tonnelle Ave., Jersey City, N. J., and consists of a one-story brick and steel building having approximately 6000 square feet of floor space. It is equipped with facilities for manufacturing, casing, finishing, and recutting all types of sintered-carbide dies. Equipment will also be installed for the production, brazing, and finishing of blanks and cutting tools. The operations in the new plant are under the direction of JOHN KONTRA, JOSEPH HALL, and JOHN ADLER, who were formerly associated with the Union Wire Die Co.

Ohio and Pennsylvania

A. J. AULERICH, who was identified with the Progressive Welder Co., Detroit, Mich., in the development of the first hydromatic welder, and who has been for the last four years in that company's Detroit sales and service division, has been transferred to Dayton, Ohio, where he will handle sales for the company in both Ohio and Indiana. His headquarters will be 503 Callahan Bldg., Dayton.

TOLEDO SCALE CO., Toledo, Ohio, has broken ground for a new five-acre building for the home office and factory. The new structure will combine the six different plants that the company now operates in Toledo. The main plant will be a one-story brick and concrete structure, so designed as to insure full daylight throughout.

MCKAY CO., manufacturer of chains and arc-welding electrodes, is transferring its general sales, order, invoicing, and purchasing departments from the Pittsburgh office to the York, Pa., factory, where the majority of the company's operations are centered. The executive departments and a district sales office will remain in the McKay Bldg., 1005 Liberty Ave., Pittsburgh.

DONALD J. RIDDELL, formerly welding specialist at the Philadelphia Works of the General Electric Co., has been appointed eastern district representative for the Progressive Welder Co., Detroit, Mich. Mr. Riddell's territory will include all the states east of Ohio, and his headquarters will be at 2308 Chestnut Ave., Ardmore, Pa.

C. N. KIRKPATRICK has been elected a vice-president of the Landis Machine Co., Waynesboro, Pa., manufacturer of thread-cutting equipment. Mr. Kirkpatrick will continue to serve as secretary of the company.

Texas and Louisiana

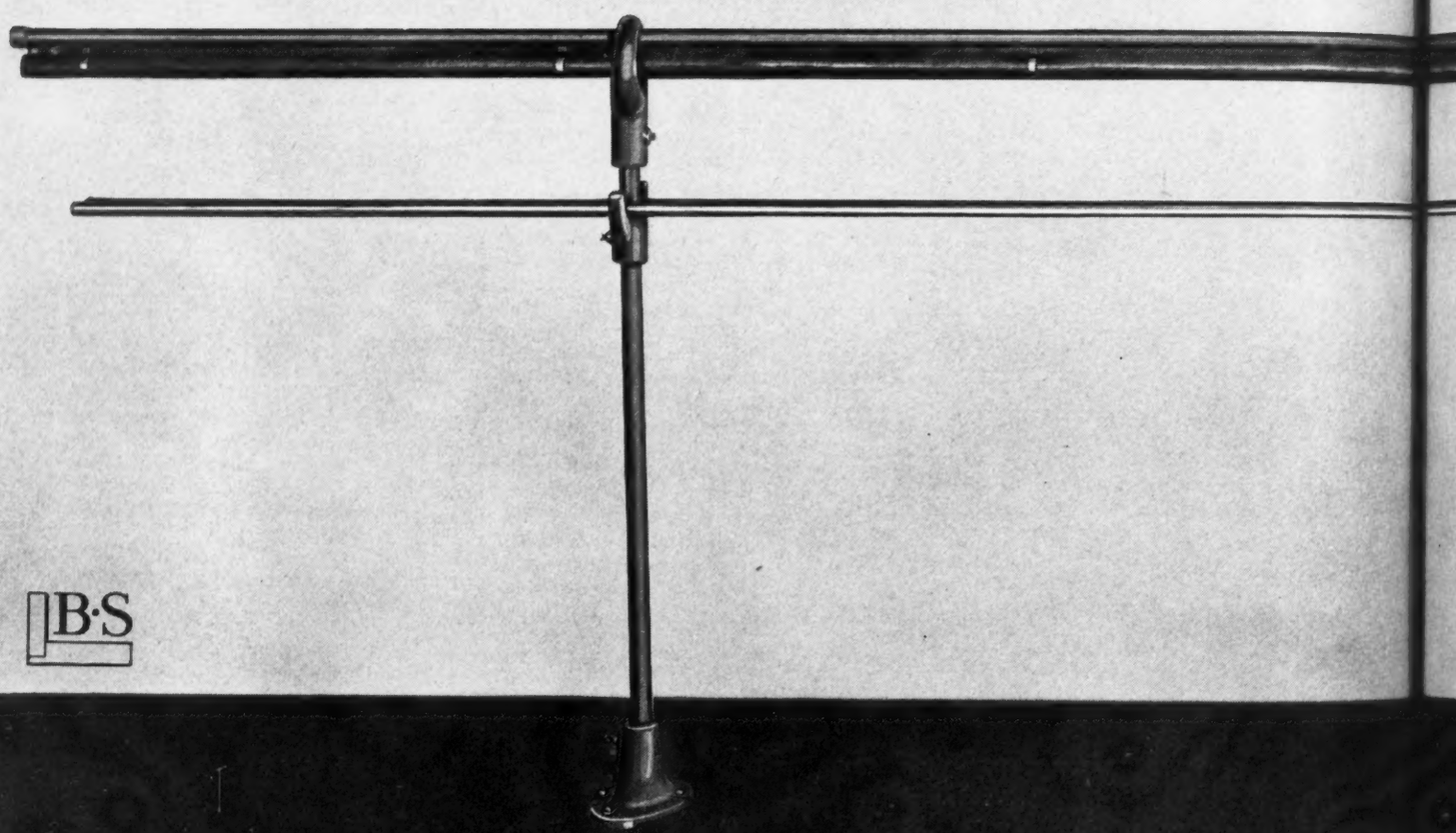
JOE FAL, service man for the Warner & Swasey Co., Cleveland, Ohio, whose headquarters are in Houston, Tex., is temporarily going to France to do supervisory work in connection with a large Warner & Swasey installation. During his absence he will be succeeded by ELMER WROBBEL, who has been doing service work for the company in the northeastern part of the United States during the last five years.

W. F. PRAVEL has been appointed district sales manager of the Allegheny-Ludlum Steel Corporation's Houston, Tex., territory.

ALLIS-CHALMERS MFG. CO. announces that the Shreveport, La., office of the company has been moved from 712 Ardis Bldg. to 611 City Bank Bldg. L. G. PARK remains in charge.

MODERN WIRE FEED
Profitable — for Short Runs

Quickly set up—Simple to operate—Minimum number of controls—Sturdy—Amply and efficiently powered



B·S

No 0

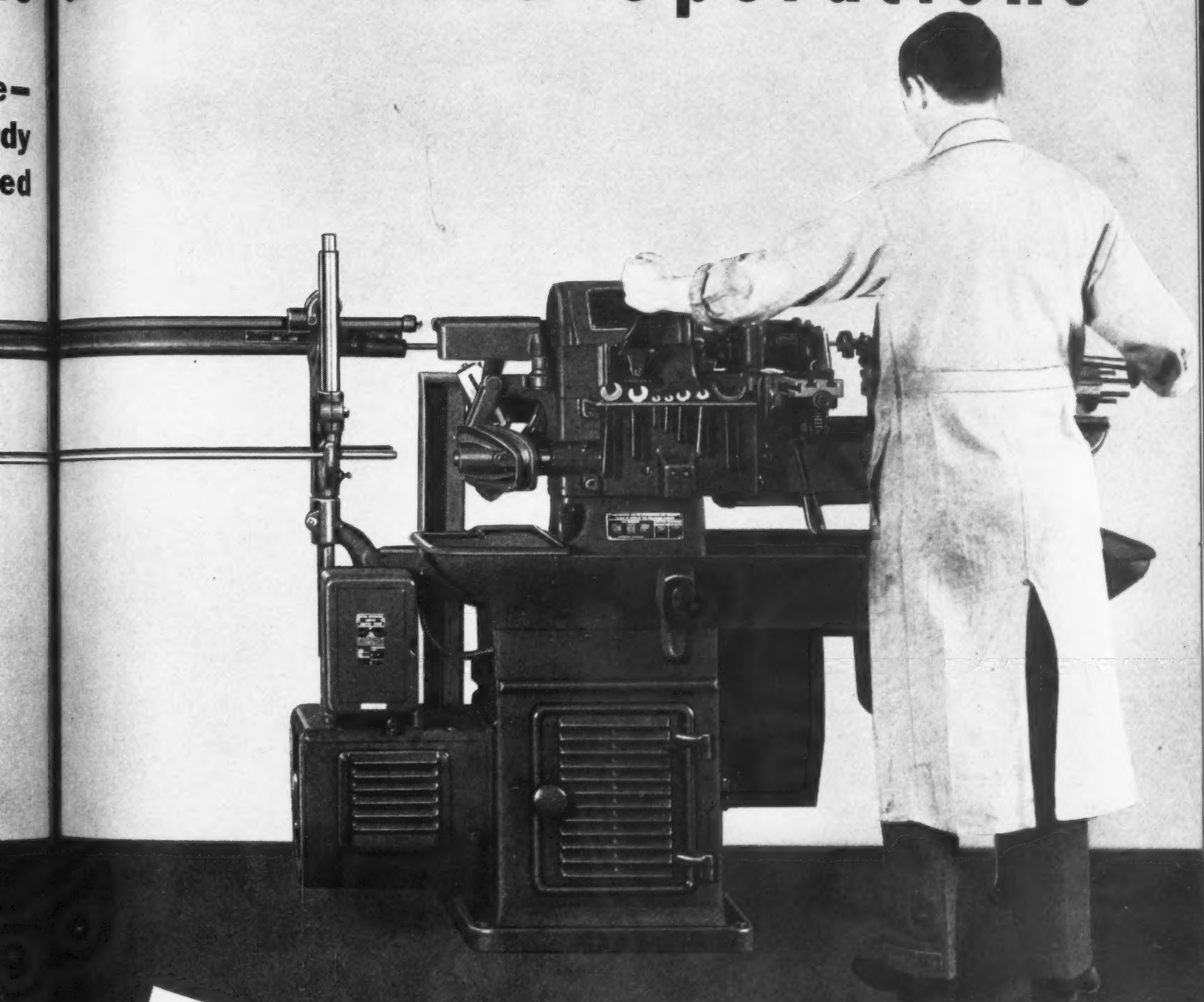
Hole through largest regular feeding finger ..... 3/8"
Turns any length to ..... 2 1/4"
Greatest distance, turret to front of chuck ..... 7"
Motor or Overhead Drive

No 1

Hole through largest regular feeding finger ..... 5/8"
Turns any length to ..... 4"
Greatest distance, turret to front of chuck ..... 12 1/2"
Motor or Overhead Drive

BROWN &

SCREW MACHINES.... and Second Operations



No 2

Hole through largest regular feeding finger..... 1″
Turns any length to..... 6″
Greatest distance, turret to front of chuck..... 18″
Motor or Overhead Drive

Details on request.
Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

& SHARPE

Wisconsin and Minnesota

KIEKHAEFER CORPORATION has recently been formed at Cedarburg, Wis., by Elmer C. Kiekhaefer, to manufacture Thor outboard motors, supercharges for internal combustion engines, magnetic type landing gear brakes for airplanes, magnetic brakes, clutches, separators, and specialties. The officers of the company are: President, A. C. Kiekhaefer; vice-president, in charge of engineering, Elmer C. Kiekhaefer; secretary, John G. Blank; and treasurer, Edgar J. Roth.

L. J. KAUFMAN MFG. CO., Manitowoc, Wis., has purchased the line of tapping machines made by the W. GATERMAN MFG. CO., also of Manitowoc. In the future, these tapping machines will be manufactured in the Kaufman plant. A new "Hi-duty" tapper is announced, which operates on the same principle as a hand tapper, but is much more sensitive.

JAMES S. LATUCKY has been appointed sales and advertising manager of the Gilman Engineering Works, Janesville, Wis.

LINCOLN ELECTRIC CO., Cleveland, Ohio, manufacturer of arc-welding equipment, announces the opening of a new office in Duluth, Minn., at 222 S. 21st Ave., East., where a stock of electric welders, electrodes, and supplies will be maintained. I. R. BARTTER, formerly with the Minneapolis office of the company, will be in charge of the new branch.

* * *

Exports of Metal-Working Machinery

While the exports of power-driven metal-working machinery in February were below the exports for the corresponding month last year, according to the Machinery Division of the Department of Commerce, Washington, D. C., the exports still represented a very high

OBITUARIES

Philip E. Bliss

Philip E. Bliss, president of the Warner & Swasey Co., Cleveland, Ohio, since 1928, died suddenly on April 11, of a heart ailment, at the age of fifty-three years. Mr. Bliss had been at his desk the week before his death, directing the affairs of the company as usual. He was a native of Cleveland, Ohio, and

Blank & Stoller

Philip E. Bliss

was educated at the Ohio Wesleyan University. After graduating, he spent four and a half years in Y.M.C.A. work in Cleveland as a junior secretary and a year and a half in a similar capacity in New York City. He then returned

effacing personality. He was a man of high ideals, and those who had the privilege of knowing him intimately had a profound admiration and affection for him. As chief executive of his company, he took a genuine interest in the welfare of his employes, and always encouraged them to come to him with their problems. His loss will be keenly felt by the members of his organization, as well as throughout the machine tool industry.

Samuel M. Nicholson

Colonel Samuel M. Nicholson, president of the Nicholson File Co. and the American Screw Co., and a prominent figure in American industry during the last half-century, died on April 7 at his home in Providence, R. I., after an illness of several months. Colonel Nicholson was seventy-eight years of age. He was born in Providence on February 25, 1861.

In 1879, after completing his education, he entered the employ of the Nicholson File Co., the business of his father, William T. Nicholson, who was a pioneer in the production of machine-cut files. In the early years of his connection with the company he became familiar with the manufacturing methods and general accounting and office work. Later he served as foreign sales representative and sales executive.

In 1881, he was made secretary of the company, and was elected a director in 1890. The following year he was made vice-president, and upon the death of his father in 1893, was elected president and general manager. The rapid growth and development of the company under his guidance was attributed in no small part to the knowledge of world markets he had gained while serving as the company's foreign sales representative.

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Exports of Metal-Working Machinery

While the exports of power-driven metal-working machinery in February were below the exports for the corresponding month last year, according to the Machinery Division of the Department of Commerce, Washington, D. C., the exports still represented a very high value, amounting to $7,833,000. Of this total, boring mills and chucking machines accounted for $290,000; milling machines, $1,596,000; planers and shapers, $255,000; thread-cutting and automatic screw machines, $337,000; gear-cutting machines, $284,000; drilling machines, $273,000; and grinding machines, $485,000.

* * *

During the last fifteen years, the chemists and engineers engaged in the petroleum industry have, through their discoveries, made possible a reduction of three cents in the cost of manufacturing a gallon of gasoline from crude oil. In the meantime, the Government has increased taxes on gasoline to an extent greater than the saving made by the chemist and engineer. This condition also obtains in many industrial fields.

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Mr. Bliss was broadly interested in educational and philanthropic activities He was a member of the executive committee of the National Industrial Conference Board, a past-president of the National Machine Tool Builders' Association, and a member of the American Society of Mechanical Engineers and of the Cleveland Engineering Society, as well as of many other business and civic organizations. He also served as a trustee of the Case School of Applied Science.

Mr. Bliss, although recognized as one of the country's leaders in the machine tool industry, was of a quiet and self-effacing personality. He was a man of high ideals, and those who had the privilege of knowing him intimately had a profound admiration and affection for him. As chief executive of his company, he took a genuine interest in the welfare of his employes, and always encouraged them to come to him with their problems. His loss will be keenly felt by the members of his organization, as well as throughout the machine tool industry.

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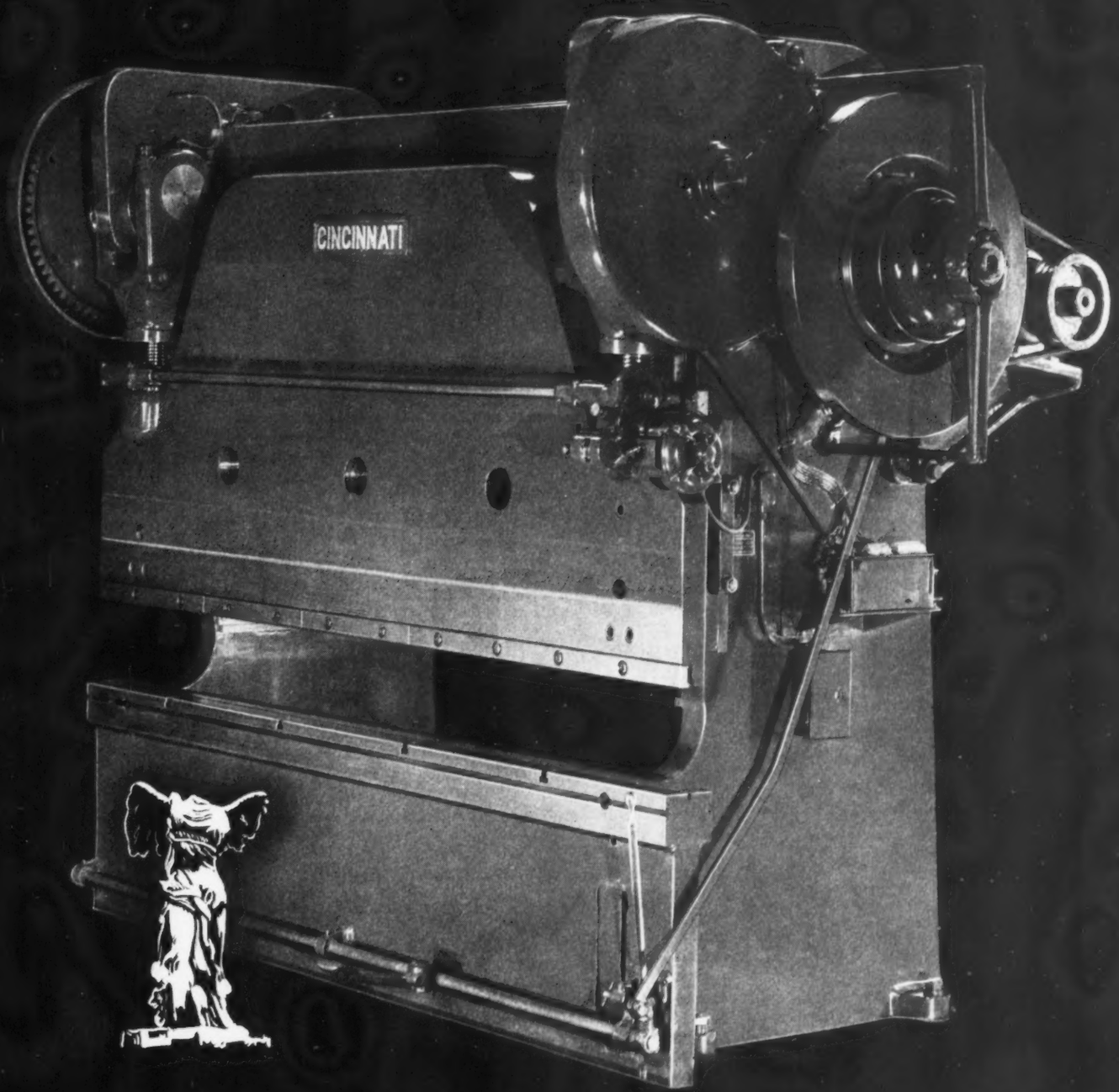


Parts just naturally fit together when formed on Cincinnati Press Brakes • • • •

Write for descriptive literature.

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

was elected president and general manager. In that capacity, he directed the affairs of the American Screw Co., as well as the Nicholson File Co. In addition, he served as chairman of the board of the Industrial Trust Co. of Providence, and as a director of several other banks and insurance companies.

Elwood Burdsall

Elwood Burdsall, secretary-treasurer of the Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y., died March 10 at the age of eighty-two years, following an illness of six months. Mr. Burdsall was born in Purchase, N. Y., near Port Chester. After graduating from Cornell University in 1878 with the degree of mechanical engineer, he went to work for the bolt and nut company that was founded by his father and William E. Ward in 1845. The company was subsequently merged with the William L. Ward Co. into the present Russell, Burdsall & Ward Bolt and Nut Co. Mr. Burdsall worked up through the business, becoming secretary in 1901 and secretary-treasurer in 1915.

He was a member of the American Society of Mechanical Engineers and had various other organization and business affiliations. He is survived by three sons, two of whom, Richard L. and Robert H., are associated with the Russell, Burdsall & Ward Bolt and Nut Co.

WALTER BROMLEY, assistant sales manager of the American Screw Co., Providence, R. I., died on March 3. Mr. Bromley had just completed his fortieth year of service in the employ of the company, having joined the firm on February 3, 1899. Because his duties took him to many parts of the country, he enjoyed an extremely wide acquaintanceship. Until 1915 he traveled in the South; later in the middle Atlantic and mid-western states; and finally in New England. He was appointed assistant sales manager in May, 1937.

J. R. FORRER, representative for a number of American machine tool manufacturers in Zurich, Switzerland, died recently in Switzerland after a few days' illness. Mr. Forrer, who had been connected with the machine tool industry for forty years, was well known in that industry both abroad and in this country. He had the complete confidence of all those who had the privilege of benefiting by his wide experience and absolute integrity.

* * *

Since the beginning of the automobile industry, it is estimated that close to 90,000,000 vehicles have been produced throughout the world. Of this total, the United States and Canada have produced approximately 76,000,000 vehicles.

NEW BOOKS AND PUBLICATIONS

THE ENGINEERS' MANUAL. By Ralph G. Hudson. 340 pages, 5 by 8 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City. Price, $2.75.

This is the second edition of a book originally published in 1917. The first edition passed through numerous printings and many changes and additions were made in each printing. The present edition represents substantial improvements in all parts of the book. The entire chapter on Heat and a large part of the chapter on Electricity have been rewritten and brought up to date. The author, who is professor of electrical engineering in charge of the courses in general science and general engineering at the Massachusetts Institute of Technology, has had the cooperation of several well qualified engineers and educators.

Among the changes in the second edition may be mentioned revisions and extensions of all tables of physical constants, new steam tables, recomputation of all conversion factors affected by the latest definition of the British Thermal Unit and an enlarged table of conversion factors. The book contains complete collections of formulas in mathematics, mechanics, strength of materials, hydraulics, heat, and electricity, together with an extended section of mathematical tables.

THE THEORY OF MACHINES. By Thomas Bevan. 549 pages, 6 by 9 inches. Published by Longmans, Green & Co., 114 Fifth Ave., New York City. Price, $5.40.

This book has been written chiefly to meet the needs of the student who is preparing for a university degree in engineering, but many of the sections should be of value to the draftsman and designer as well. The book is divided into fifteen chapters dealing with the following subjects: Simple Mechanisms; Motion—Inertia; Velocity and Acceleration; Mechanisms with Lower Pairs; Valve Diagrams and Valve Gears; Friction; Belt, Rope, and Chain Drives; Brakes and Dynamometers; Cams; Toothed Gearing; Gear Trains; The Equilibrium of Machines—Turning Moment—The Flywheel; Governors; Balancing; and Vibrations. A large number of examples are worked out in the text, and graphical solutions are given in some cases. In addition, many problems are included for the use of students.

PATENT TACTICS AND LAW. By Roger Sherman Hoar. 315 pages, 6 by 8 1/2 inches. Published by the Ronald Press Co., 15 E. 26th St., New York City. Price, $4.50.

This is a revised edition of the author's original book on patents, designed to contain specifically what the industrial executive and engineer should know about this subject. The best idea of what this book contains may be gained from a list of the chapter heads: What is a Patent?; The Business Aspect of Patents; What is Patentable?; Anticipation and Domination; Who is Entitled to a Patent?; Preliminary Protection; Drafting the Application; Fighting it Out; Miscellaneous Considerations of Prosecution; Interferences; Appeals and the Like; Protecting a Patent; Conflicting Rights; Infringements; Searches; Foreign Patents; The Choice of an Attorney; Organizing a Patent Department; Interpretation and Validity; Legal Papers; Forms for Patent Contracts; Misconceptions Summarized; Table of Cases.

EFFECT OF TEMPERATURE ON THE PROPERTIES OF METALS. 864 pages; 273 graphs and 37 tables. Published jointly by the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa., and the American Society of Mechanical Engineers, 29 W. 39th St., New York City. Price, $12 in the United States and Canada; elsewhere, $14.

This volume, published by a joint research committee of the two Societies that sponsor the volume, provides in convenient form the available important data on high-temperature creep characteristics of metals and alloys, including both rolled steels and ferrous alloys, cast steels, cast ferrous alloys, and nonferrous metals.

YOU AND YOUR MONEY. By C. Donald Dallas. 85 pages, 5 1/2 by 8 1/2 inches. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York City. Price, $1.50.

This little book should be of interest to all those concerned with the economic and human problems confronting the world today. The author explains the principles underlying capitalism and communism; capital and labor; investments and investing; taxes; and the struggle for security. He attempts to give, in simple language, the facts underlying our present political, economic, and social problems, a clear understanding of which is necessary for their solution.

DIESEL ENGINES—THEORY AND DESIGN. By Howard E. Degler. 270 pages, 5 1/2 by 8 1/2 inches. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price, $2.50.

convenience

There's no expensive waste of effort or time with the Super-Service on the job! Bulletin R-24 explains the engineering which eliminates this great source of waste in radial drill operations. Send for your copy. There's no obligation.

Walking from spindle to column, from column to spindle, back and forth all day, to manipulate the various controls of the ordinary radial—these strollings and the climbing up and down on big jobs can total up to quite a parade—of waste! At times this waste amounts to as much as 80% of the total time. This doesn't happen with the Super-Service Radial because all controls are where they should be—at the head! Thirty-six selective spindle speeds. Eighteen feed changes. Rapid power traverse of head on arm. Power clamping of arm and column. All these controls on the Super-Service are at the head—low, within convenient arm's reach of the operator's normal working position.

THE CINCINNATI BICKFORD TOOL COMPANY

OAKLEY, CINCINNATI, OHIO

This book is intended primarily for the use of students, designers, and draftsmen. It discusses the thermodynamics of internal-combustion cycles; fuels, combustion, and combustion chambers; testing and performance; principles of engine design; and design of major engine parts.

PROCEEDINGS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS FOR 1938. Published in two volumes: Part I, Committee reports and new tentative standards; Part II, Technical papers and discussions. Both parts comprise 2080 pages. Price of each part, $5.50 in stiff paper cover, $6 in cloth, and $7 in half-leather binding. Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.

A STUDY OF HAND MOTIONS USED IN SMALL ASSEMBLY WORK. By Ralph M. Barnes and Marvin E. Mundel. 68 pages, 6 by 9 inches. Published by the University of Iowa, Iowa City, Iowa, as Bulletin No. 16 in a series on "Studies in Engineering." Price, 50 cents.

LIGHTING FOR PRODUCTION IN THE FACTORY. By A. K. Gaetjens and Dean M. Warren. 38 pages, 7 by 10 inches. Published by the General Electric Co., Nela Park Engineering Department, Cleveland, Ohio. Price, 20 cents.

CAPITAL GOODS AND THE AMERICAN ENTERPRISE SYSTEM. 86 pages, 6 by 9 inches. Published by the Machinery and Allied Products Institute, 221 N. LaSalle St., Chicago, Ill.

ELECTRICAL YEAR BOOK (1939). 313 pages, 4 by 6 inches. Published by Emmott & Co., Ltd., 31 King St., W., Manchester, England. Price, 1/6.

* * *

Engineers' Day at the San Francisco Fair

Wednesday, July 13, has been designated Engineers' Day at the Golden Gate International Exposition by the San Francisco Engineering Council, which is sponsoring the arrangements. The engineering profession is invited to attend this commemoration of the engineer's contribution to human welfare. The celebration will occur during the week of the national conventions of the American Society of Mechanical Engineers and the American Institute of Mining and Metallurgical Engineers. It closely follows the national conventions of the American Institute of Electrical Engineers, the Institute of Radio Engineers, and the Association for the Advancement of Science, and closely precedes the conventions of the American Society of Civil Engineers and the Western Chemical Congress.

COMING EVENTS

MAY 15-17—Annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at Hotel Cavalier, Virginia Beach, Va. J. C. McQuiston, manager-secretary, 602 Shields Bldg., Wilkinsburg, Pa.

MAY 15-18—Annual convention of the AMERICAN FOUNDRYMEN'S ASSOCIATION in Cincinnati, Ohio. C. E. Hoyt, executive vice-president, 222 W. Adams St., Chicago, Ill.

MAY 22 - JUNE 8 — WORLD AUTOMOTIVE ENGINEERING CONGRESS, to be held in New York, Indianapolis, Detroit, and San Francisco under the auspices of the Society of Automotive Engineers. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

MAY 24-25—Forty-first annual convention of the NATIONAL METAL TRADES ASSOCIATION at the Palmer House, Chicago, Ill. Homer D. Sayre, commissioner, 122 S. Michigan Ave., Chicago, Ill.

JUNE 5-6—Spring convention of the ASSOCIATED MACHINE TOOL DEALERS of AMERICA at the Van Curler Hotel, Schenectady, N. Y. Thomas A. Fernley, Jr., 505 Arch St., Philadelphia, Pa., executive secretary.

JUNE 25-JULY 1 — THIRTEENTH INTERNATIONAL CONGRESS OF CARBIDE, ACETYLENE, OXY-ACETYLENE WELDING AND ALLIED INDUSTRIES, to be held in Munich, Germany. Further information can be obtained from the International Acetylene Association, 30 E. 42nd St., New York City.

JUNE 26-30—Forty-second annual meeting and fifth EXHIBIT OF APPARATUS AND INSTRUMENTS of the AMERICAN SOCIETY FOR TESTING MATERIALS at Chalfonte-Haddon Hall, Atlantic City, N. J. Further information can be obtained from the secretary of the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.

JULY 10-14 — Semi-annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at San Francisco, Calif. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

SEPTEMBER 4-8 — Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Bldg., 29 W. 39th St., New York City. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

OCTOBER 15-21—Fortieth annual NATIONAL AUTOMOBILE SHOW, to be held at the Grand Central Palace, New York City. For further information, address the Automobile Manufacturers Association, General Motors Bldg., Detroit, Mich.

OCTOBER 16-20—NATIONAL SAFETY CONGRESS AND EXPOSITION in Atlantic City, N. J. For further information, address the National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

OCTOBER 23-27—NATIONAL METAL EXPOSITION to be held in conjunction with the annual meeting of the AMERICAN SOCIETY FOR METALS in the International Amphitheater, Chicago, Ill. W. H. Eisenman, secretary, American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.

DECEMBER 4-9—Seventeenth EXPOSITION OF CHEMICAL INDUSTRIES in the Grand Central Palace, New York City. For further information apply to Charles F. Roth, president of the International Exposition Co., Grand Central Palace, New York City.

* * *

World Automotive Engineering Congress

The 1939 World Automotive Engineering Congress of the Society of Automotive Engineers will take place May 22 to June 8. The congress will open in New York on May 22, and the members will then proceed to Indianapolis, to attend the five hundred mile International Automotive Sweepstakes. Other cities at which sessions will be held include Detroit, Los Angeles, and San Francisco. Visitors will have an opportunity to attend both the New York World's Fair and the Golden Gate International Exposition.

The technical and general sessions will represent the most important gathering of authors and speakers ever brought together for discussion of automotive problems. Fourteen foreign countries and more than thirty technical societies from abroad are expected to participate. There will be discussions of the latest advances in automotive engineering in the United States and abroad. Past, present, and future of automobile body design; an analysis of European small cars; composite frame and body construction; and hydraulic transmissions will be among the more important papers on automobiles.

* * *

General Electric Employes Honored for Cost-Saving Suggestions

Eighteen employes of the General Electric Co. were presented with the Charles A. Coffin Award for 1938 in recognition of suggestions made for improvements in the company's products or manufacturing methods which have resulted in a substantial saving in manufacturing costs. In some cases, the saving amounted to as much as $20,000 a year. The award consists of a framed certificate and a cash honorarium.

NEWS OF THE INDUSTRY

California

WESTCOTT CHUCK CO., Oneida, N. Y., has appointed the R. R. VOUGHT CO., 518 Monadnock Bldg., San Francisco, Calif., direct factory representative in charge of sales of Westcott chucks and Casler offset boring heads in the states of California, Oregon, and Washington. The company will maintain a representative stock of these tools for convenient distribution on the Pacific Coast.

SIERLING PRODUCTS CO., manufacturer of Speed-Bloc sanders and air accessories, has recently completed a new plant at 8925 Aguinaldo Ave., Los Angeles, Calif., having over 10,000 square feet of floor space.

Foreign

SCHIESS-DEFRIES A. G., Düsseldorf, Germany, whose firm name has recently been changed to SCHIESS A.G., announces that the company has acquired the firm of LOUIS SOEST & CO. of Düsseldorf-Reisholz.

Georgia and Florida

WARD LEONARD ELECTRIC CO., Mount Vernon, N. Y., announces the appointment of C. B. ROGERS, Zahner Bldg., 1000 Peachtree St., N.E., Atlanta, Ga., as representative for the sale of Ward Leonard electric control devices in the states of Georgia, South Carolina, and North Carolina.

ELLIS GEORGE MALPAS, for nearly twenty years factory manager of the Sealed Power Corporation, Muskegon, Mich., has resigned to retire from industrial activities. He is planning to move to Rockledge, Florida, where he will devote his time to raising oranges and grapefruit.

Illinois and Missouri

SKILSAW, INC., 5039 Elston Ave., Chicago, Ill., has found it necessary already to provide an addition to its new factory, which was occupied early this year. The addition will provide space for a larger drafting-room and more extensive research facilities which are required because of a 70 per cent increase in the sale of Skilsaw portable electric saws during the first quarter of 1939. The new factory and offices represent an increase of two and a half times the space previously occupied and more than quadruple the capacity.

LINK-BELT CO., 307 N. Michigan Ave., Chicago, Ill., has acquired the SPEEDER MACHINERY CORPORATION, Cedar Rapids, Iowa, manufacturer of material-handling equipment such as cranes, shovels, etc., and will consolidate the business with the Shovel Division of the Link-Belt Co. The Speeder Machinery Corporation will be operated as a subsidiary of the Link-Belt Co., with the present management continuing to operate the business.

PHILADELPHIA GEAR WORKS, Philadelphia, Pa., manufacturer of speed reducers, gears, and the Limitorque automatic valve control, has opened a new branch office at 111 W. Washington St., Chicago, Ill. The district manager will be A. R. HERBERT, who is a graduate mechanical engineer and has had twelve years experience in the gear and power transmission field.

AJAX FLEXIBLE COUPLING CO., Westfield, N. Y., has appointed the CHICAGO PULLEY AND SHAFTING CO., 17-23 N. Desplaines St., Chicago, Ill., distributor of Ajax flexible couplings.

OHIO GEAR CO., Cleveland, Ohio, has appointed the KANSAS CITY RUBBER AND BELTING CO. sales representative in the Kansas City, Mo., area, handling the complete line of gears and speed reducers manufactured by the company.

Michigan

MELVIN PATTISON resigned as president and treasurer of the Industrial Brownhoist Corporation, Bay City, Mich., at a special meeting of the board of directors and was elected chairman of the board. HOYT E. HAYES, vice-president, was elected president and treasurer, and JAMES B. HAYDEN, assistant sales manager, was appointed sales manager.

H. Y. BASSETT has joined the staff of the Wolverine Tube Co., 1411 Central Ave., Detroit, Mich., as research engineer. Mr. Bassett was formerly connected with the Surface Combustion Corporation Toledo, Ohio. R. F. MOODY, previously with the Carrier Corporation, Syracuse, N. Y., has also joined the sales department of the company.

A. C. DANEKIND of the General Electric Co., Schenectady, N. Y., has been elected a director of the Carboloy Company, Inc., Detroit, Mich. Mr. Danekind has been associated with the General Electric Co. since 1933.

C. H. KUTHE has been appointed technical advisor to the Michigan Division of Revere Copper and Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich. Mr. Kuthe was previously connected with the Steel and Tubes Division of the Timken Roller Bearing Co., Canton, O.

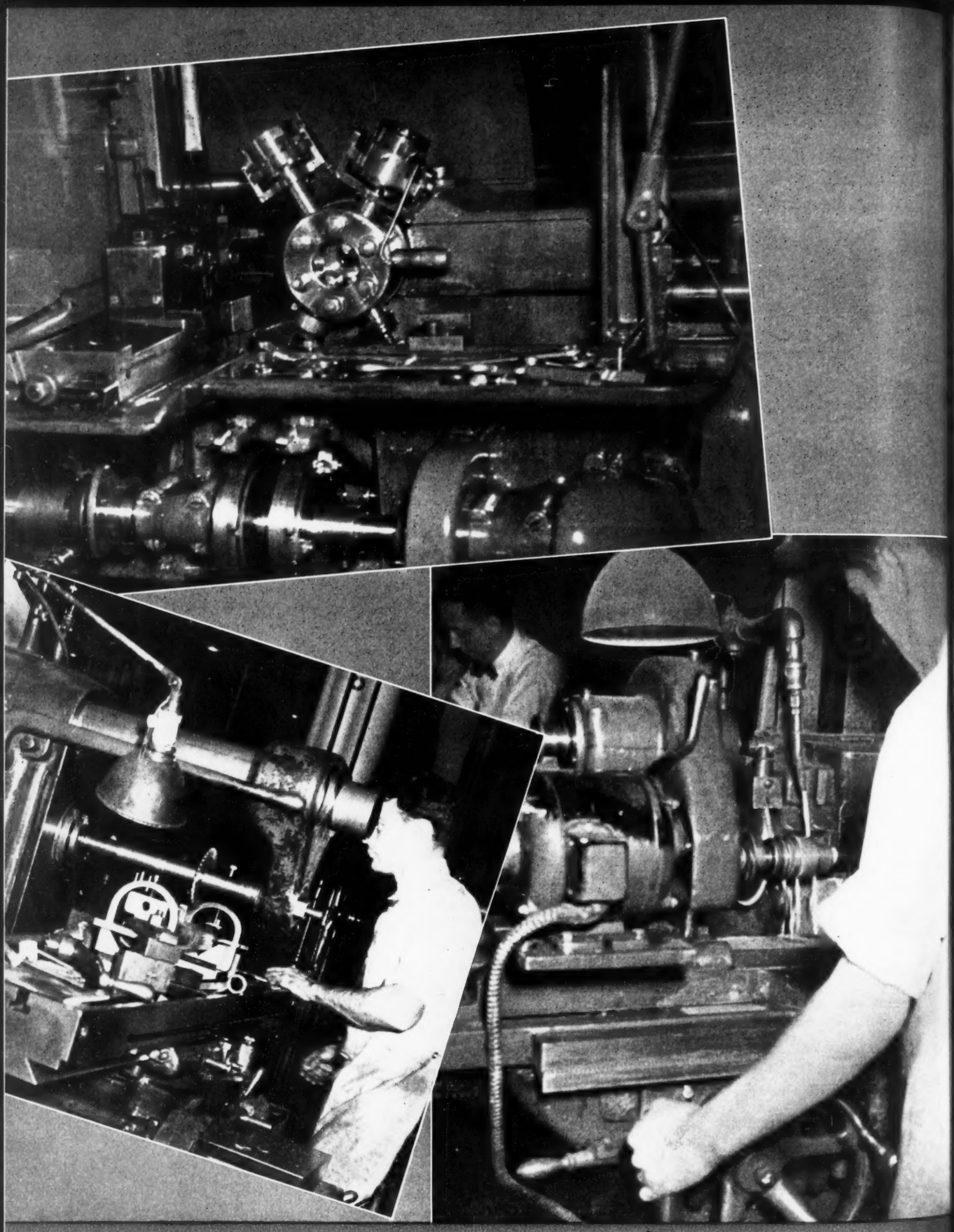
New England

C. C. ZIEGLER, formerly western district sales manager of the Greenfield Tap & Die Corporation, Greenfield, Mass., has been elected vice-president in charge of sales, with headquarters at

C. C. Ziegler, Vice-president in Charge of Sales, Greenfield Tap & Die Corporation

Greenfield, succeeding W. B. DUMONT, who has resigned. ELMER C. BRYANT, formerly manager of the gage department, will succeed Mr. Ziegler as western district sales manager, with headquarters at Chicago, Ill. EDWARD C. BAILEY, previously sales promotion manager, has been made eastern district sales manager, with headquarters at New York City, succeeding the late Charles H. Coe. GLEN STIMSON, previously chief engineer at the Detroit plant, has been appointed gage sales manager, with headquarters at Greenfield.

JOSEPH T. RYERSON & SON, INC., 16th and Rockwell Sts., Chicago, Ill., is enlarging and modernizing its Steel Service Plant at Third and Binney Sts., Cambridge, Mass. The total ground area occupied has been increased more than 30 per cent, and the storage facilities to a still greater extent through the construction of a multiple-story building and the remodeling and extension of existing buildings. To increase the speed of handling and the accurate cutting of materials, a wide range of new equipment has been added, including cranes, flame-cutting equipment, etc. More than five thousand new items have been added to stocks.



BROWN &

In Aircraft Plants

- - - - BROWN & SHARPE

Milling Machines–
Grinding Machines–
Screw Machines–

are employed in the toolrooms and on quantity manufacturing to produce work to the high standards of accuracy so essential to Modern Aviation

New No. 141 Catalog lists the entire line . . copy sent on request.

BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

B·S

Views show a few of the Brown & Sharpe Milling, Grinding and Screw Machines in the plant of a prominent maker of aircraft motors.

& SHARPE

Paul C. Nicholson, New President and General Manager of the Nicholson File Co.

PAUL COE NICHOLSON has been elected president and general manager of the Nicholson File Co., Providence, R. I., succeeding his father, the late Colonel Samuel Mowry Nicholson. The new president has been actively identified with the company for more than a quarter of a century. After graduating from Yale University, he went into the business headed by his father, going through the various departments in order to learn the business thoroughly. In 1913, he was elected vice-president of the company, and in 1915 assumed the additional duties of treasurer. He is also president of the American Screw Co. and of John R. White & Son, Inc., as well as a director of various companies.

NORTON CO., Worcester, Mass., held Open House Saturday, May 13, for the company's employes and their relatives, as well as for other visitors, between 9 A.M. and 5 P.M. Many thousands of people were welcomed and escorted through the administration building and the company's newly completed plants. The plant was also open to invited visitors, Monday evening, May 15. The unusual exhibit of products, safety and welfare equipment, and precision instruments, prepared for the employes' Open House, was viewed by the visitors.

ROGER C. JONES has been appointed representative of the Philadelphia Gear Works, Philadelphia, Pa., in the New England territory, with headquarters at Hartford, Conn.

NEW DEPARTURE DIVISION GENERAL MOTORS CORPORATION, Bristol, Conn., recently held a three-day conference of the company's sales engineers for the purpose of discussing sales problems. Visits were made to the Bristol and Meriden, Conn., plants of the company to acquaint the sales staff with the new materials and processes in operation. At a dinner given in connection with the conference, the general manager of the company, F. G. Hughes, traced the history and achievements of the New Departure Co., which is celebrating its fiftieth anniversary this year.

New York and New Jersey

BALDWIN-DUCKWORTH CHAIN CORPORATION, Springfield, Mass., recently opened sales and engineering offices and warerooms at 276 Canal St., New York City. The new office will be under the management of K. B. BRANDENBURG, who is being transferred from the Detroit office. F. T. LANGE will take Mr. Brandenburg's place in Detroit, with headquarters at 2-165 General Motors Bldg.

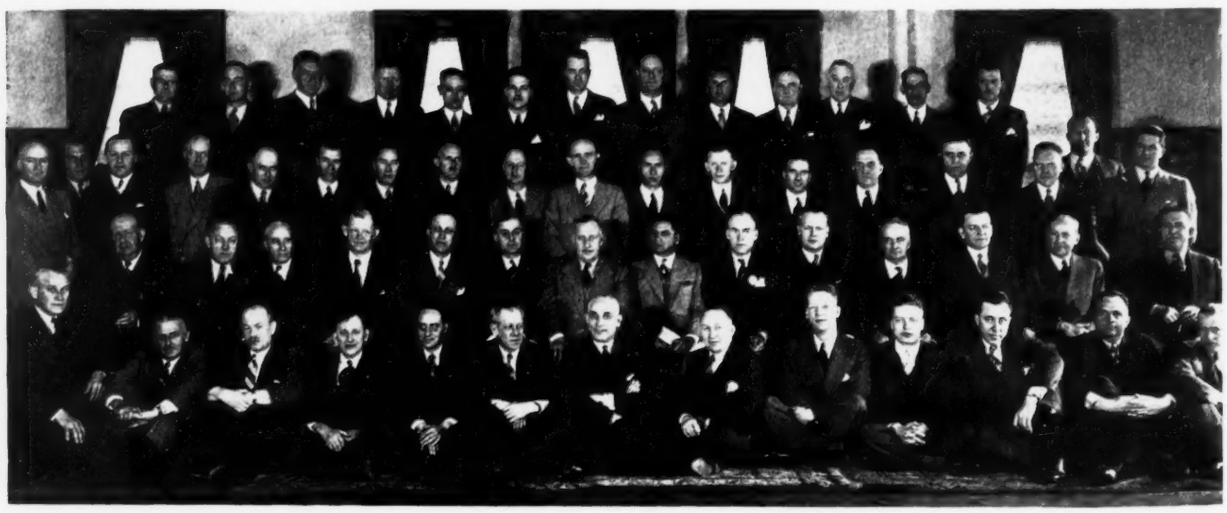
INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York City, announces the establishment of a new field office at 67 Wall St., under the direction of J. W. SANDS. The territory covered by this office includes metropolitan New York, Long Island, New Jersey, part of Pennsylvania, Delaware, Maryland, Virginia, and the District of Columbia.

ESTERLINE-ANGUS CO., INC., Indianapolis, Ind., manufacturer of recording instruments, has appointed H. L. HILDENBRAND, 36-43 212th St., Bayside, Long Island, N. Y., exclusive representative of the company for the metropolitan New York area.

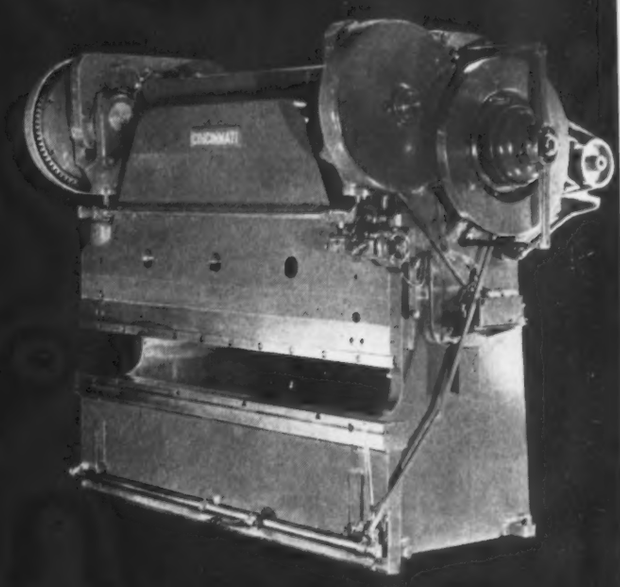
JOHN STORM has been appointed New York district sales manager of the Carborundum Co., Niagara Falls, N. Y., with

John Storm, New York District Sales Manager of Carborundum Co.

headquarters at the company's branch warehouse and sales office, 601 W. 26th St., New York City. He succeeds FRANK J. HARRINGTON, who has been transferred



Group of Sales Engineers Attending Sales Conference of New Departure Division, General Motors Corporation Recently Held at the Bristol, Conn., Plant of the Company



Close fitting···free acting ···continuous hinges are produced at low cost on Cincinnati Press Brakes.

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS · SHEARS · BRAKES

Charles J. Stilwell, Recently Elected President of the Warner & Swasey Co.

Clifford S. Stilwell, Who Has Become Executive Vice-president of the Company

Greystone Studios, Inc.

L. D. McDonald, Newly Elected Vice-president of the Warner & Swasey Co.

to the sales department at the main office in Niagara Falls. Mr. Storm was previously a member of the sales staff at the Detroit branch warehouse and sales office.

RESISTOFLEX CORPORATION, manufacturer of tubing, sheet material, and molded shapes made from the synthetic flexible resin known as "Resistoflex," has removed its Dover, N. J., plant and its executive offices (formerly in New York City) to Belleville, N. J.

Ohio

CHARLES J. STILWELL, vice-president of the Warner & Swasey Co., Cleveland, Ohio, maker of turret lathes and telescopes, was elected president of the company at a recent meeting of the board of directors to take the place of the late Philip E. Bliss. CLIFFORD S. STILWELL, vice-president, was elected executive vice-president, and L. D. MCDONALD, assistant treasurer, was elected vice-president. Charles Stilwell has been connected with the company since his graduation from Denison University in 1910. He has served successively as European representative of the company, general sales manager, vice-president, and director. In 1934, he served as president of the National Machine Tool Builders' Association. Clifford Stilwell, brother of Charles Stilwell, also became connected with the Warner & Swasey Co. upon graduating from Denison University in 1912. He has held the positions of district manager, general sales manager, director, and vice-president. L. D. McDonald joined the organization in 1918. He has been credit manager, assistant treasurer, and director of the company.

WALTER K. BAILEY, assistant sales manager, has been appointed sales manager. Mr. Bailey became connected with the Warner & Swasey Co. immediately following his graduation from Oberlin College in 1919. He has served as sales manager of the Cleveland district, service manager, and assistant sales manager. As executive in direct charge of sales, Mr. Bailey assumes the responsibilities formerly held by Clifford S. Stilwell.

DR. ZAY JEFFRIES, eminent metallurgist of Cleveland, Ohio, has been elected to membership in the National Academy of Sciences. Membership in the Academy is limited to 350 members, and is recognized as the highest scientific rank an American can receive. Dr. Jeffries has made important contributions to the development of the science of metals as a result of his research with tungsten lamp filaments, high-strength aluminum alloys, and the application of X-ray analysis to metallurgy.

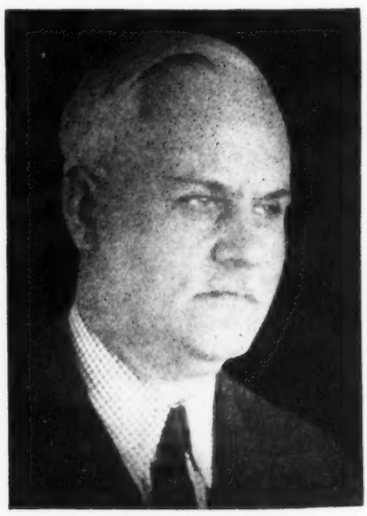
HYDRO-POWER SYSTEMS, INC., Mount Gilead, Ohio, has recently been organized for the manufacture and development of hydraulic machine drives and their component parts—radial pumps, gear pumps, valves, and controls. The company will concentrate its efforts on the application of hydraulic drives to new machinery and to the replacement field.

REYNOLDS MOLDED PLASTICS, a Division of the REYNOLDS SPRING CO., Jackson, Mich., announces the establishment of a sales office in Cleveland, Ohio, at 601 Hanna Building. ROBERT R. WILSON will be in charge of the new branch.

TOM ADDISON has been appointed chief designing engineer of the Defiance Machine Works, Defiance, Ohio. Mr. Addison has previously served as design head and engineer for a number of important tool companies in Cincinnati.

Greystone Studios, Inc.

Walter K. Bailey, Sales Manager of the Warner & Swasey Co.



Tom Addison, Chief Designing Engineer of Defiance Machine Works

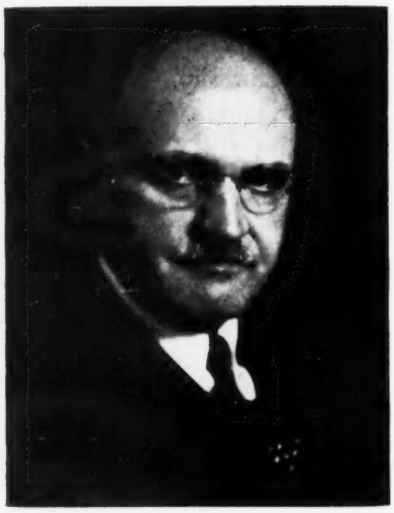
SPEED

The Super-Service is designed to deliver a constant and unvaried horsepower throughout this entire range of 36 speeds—from 26 R.P.M. to 1572 R.P.M., for example. An optional range of speeds can be supplied to suit your work. Bulletin R-24 for complete details.

Speeds on a radial drill should be controlled at the head. This requires a simple and compact gear train. The Super-Service provides just that: A simple, compact gear train consisting of only seventeen gears. All gears are of alloy steel. High speed gears have ground teeth. Shafts are short, sturdy, of alloy steel—multiple splined and supported by Timken Bearings. This Super-Service Gear train, located in the head—controlled at the head—delivers 36 selective, sliding gear changes with a 60-to-1 range. These thirty-six speeds are carefully graded in a precise geometrical progression and no speeds are lost through duplication or overlapping.

THE CINCINNATI BICKFORD TOOL COMPANY

OAKLEY, CINCINNATI, OHIO



F. G. Schranz, Recently Appointed General Manager of the Baldwin-Southwark Corporation

Pennsylvania

F. G. SCHRANZ has been appointed general manager of the Baldwin-Southwark Corporation, East Eddystone, Pa. Mr. Schranz has been actively engaged in the engineering and sales of hydraulic and special machinery for thirty-four years. He received his technical education as a mechanical and electrical engineer in Vienna. In 1915, he became associated with the Southwark Foundry and Machine Co., and it was under his direction, in cooperation with William H. Harman, now vice-president of the Baldwin-Southwark Corporation, that the manufacture of hydraulic and special machinery was commenced. Mr. Schranz served as vice-president in charge of sales and engineering and a director of the Southwark Foundry and Machine Co., and in 1929, became manager for the Southwark Division, when the company was acquired by the Baldwin Locomotive Works.

MARVIN W. SMITH, manager of engineering of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected a vice-president by the board of directors. Mr. Smith will direct all of the company's engineering activities. He has been associated with the Westinghouse organization since his graduation from the Texas Agricultural and Mechanical College in 1915.

WILLIAM B. SCAIFE & SONS CO., Pittsburgh, Pa., has established an industrial fellowship at the Mellon Institute of Industrial Research, University of Pittsburgh, for the purpose of conducting scientific research on problems pertaining to processes of fabricating and to the use of metal tanks, pressure cylinders, and water softening equipment.

AMERICAN FLEXIBLE COUPLING CO., Erie, Pa., has appointed ERIC N. GILLING, P. O. Box 4197, Pittsburgh, Pa., sales representative of the company for the territory comprising western Pennsylvania and West Virginia. The company has also appointed A. H. BURNAP, 940 Lancaster Ave., Syracuse, N. Y., sales representative for central New York state.

G. M. STICKELL has recently been advanced from the position of assistant sales manager to that of sales manager of the Landis Machine Co., Waynesboro, Pa., manufacturer of thread-cutting equipment.

R. S. AHLBRANDT has been appointed Pittsburgh district sales manager for the Allegheny-Ludlum Steel Corporation,

Trinity Court Studios

Howard M. Givens, Jr., Assistant General Manager, Tool Steel Sales, Allegheny-Ludlum Steel Corporation

Pittsburgh, Pa., succeeding J. R. KUMER, JR., who has been made assistant manager of stainless bar and wire products. HOWARD M. GIVENS, JR., previously assistant manager of sales, stainless bar and wire products, has been appointed assistant general manager of tool steel sales. Mr. Givens will make his headquarters at the company's Watervliet, N. Y., plant.

Texas

LINK-BELT CO., 307 N. Michigan Ave., Chicago, Ill., manufacturer of elevating, conveying, and power transmission equipment, has contracted for the construction of a new office and warehouse building in Dallas, Tex., to be located on Latimer St. at the intersection of Pierce St. The new building will be one story high, 105 feet wide by 225 feet long, of concrete, brick, and steel construction. The office will be air-conditioned. Adequate ground has been purchased adjacent to the present building for the future expansion of manufacturing facilities.

GORDON F. HESS, formerly assistant manager of sales of the Alloy Steel Division of the Republic Steel Corporation in Massillon, Ohio, has been appointed district sales manager of the Houston, Tex., district.

Wisconsin

HAROLD S. FALK, vice-president and general manager of the Falk Corporation, Milwaukee, Wis., was awarded the John A. Penton Gold Medal by the American Foundrymen's Association at the annual convention in Cincinnati, May 15 to 18, in recognition of his leadership in promoting interest in apprentice training. Mr. Falk has not only made the training program in his plant one of the best in a state noted for its apprentice training efforts, but he has also been a leader in this work for many years throughout the nation.

WALTER GEIST, general representative of the Allis-Chalmers Mfg. Co., Milwaukee, Wis., was elected vice-president at a recent meeting of the board of directors. Mr. Geist entered the employ of the company in February, 1909, as an errand boy. He progressed through various positions and departments, thus deriving a broad knowledge and experience of the various products of the

Walter Geist, New Vice-president of the Allis-Chalmers Mfg. Co.

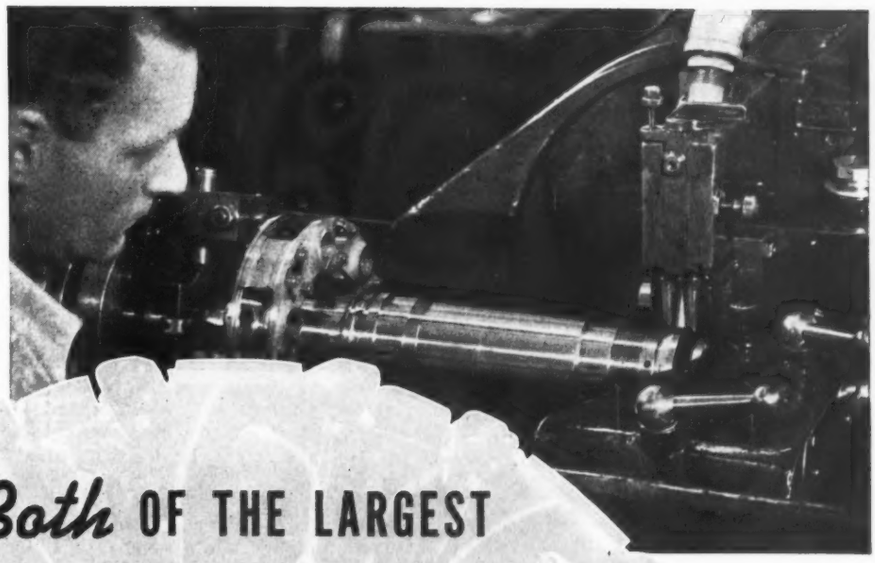
company. He was the originator of the idea of the multiple V-belt drive principle of power transmission known as the "Texrope drive."

* * *

The cylinder barrel forging for a well-known type of aircraft engine weighs 40 pounds as it comes from the forge shop. When completely machined to meet the exacting requirements, it weighs only 7 1/3 pounds.

PRATT & WHITNEY

Three sizes of propeller shafts, one of which is shown in the machine at the right, and nine sizes of crankshafts, are ground on this Ex-Cell-O Universal Precision Thread Grinder at Pratt & Whitney. Threaded sections range up to 4" in diameter; the parts range up to 32½" long overall, and up to 16⅝" diameter throw. The threads are 12 pitch, National Standard form, and are ground in the solid, hardened shafts.



Both OF THE LARGEST AIRCRAFT ENGINE BUILDERS USE *Ex-Cell-O*

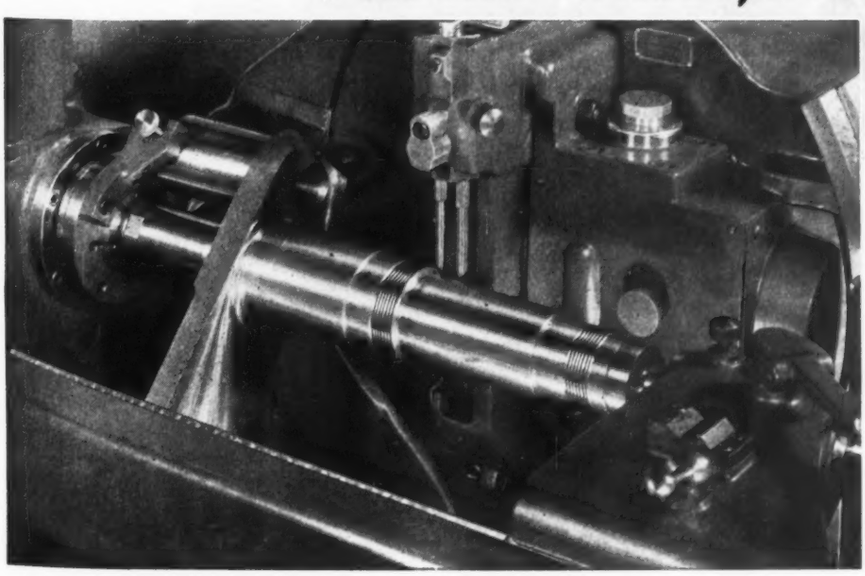
The two largest aircraft engine builders in the United States have installed Ex-Cell-O Universal Precision Thread Grinders for grinding threads in crankshafts and propeller reduction gear shafts.

Ex-Cell-O Machines were chosen for thread grinding, after rough machining and heat treating operations, in order to produce extremely accurate thread form and size, and superior finish—without sacrifice of output or increase in unit cost.

Hydraulic operation and control enable Ex-Cell-O Thread Grinders to handle a wide range of work easily, with fast changeover. Ex-Cell-O Precision Ball Bearings insure wheel spindle accuracy and long life.

EX-CELL-O CORP. • 1200 OAKMAN BLVD. • DETROIT

Precision Thread Grinders



WRIGHT AERO

One of the Wright Aero crankshafts is shown being ground on an Ex-Cell-O Thread Grinder. Two threaded sections are ground, both with 12 pitch U. S. Standard form threads. The part is 21 57/64" long overall, and has a 16⅞" diameter throw. Propeller reduction shafts are also ground on the same machine—to closer limits and with better finish than previous methods.

OBITUARIES

John G. Oliver

John G. Oliver, one of the founders of the firm of Bardons & Oliver, Inc., Cleveland, Ohio, and chairman of the board, died on April 14 at the age of seventy-seven. Mr. Oliver was born on October 7, 1861, in Worcester, Mass., and was educated at the Worcester Polytechnic Institute, from which he graduated with a B.S. degree in 1882. In the fall of that year, he went to Cleveland and started work with the Warner & Swasey Co., then a small concern founded only two years previously by Ambrose Swasey and Worcester R. Warner. Mr. Oliver became head of the drafting-room in the Warner & Swasey shop, and in that capacity drew the plans for the famous Lick telescope installed in the Lick Observatory, Mount Hamilton, Calif.

John G. Oliver

In 1891, he and George C. Bardons, superintendent of the Warner & Swasey Co., founded the firm of Bardons & Oliver. Seven years later, the company acquired Joseph Dyson & Sons, forging manufacturers, of which Mr. Oliver became president, retaining that position until his dealth

Mr. Oliver is survived by his wife, two daughters, and a son.

George C. Miller

George Carter Miller, president of the Dodge Mfg. Corporation, Mishawaka, Ind., manufacturer of power transmission equipment, died suddenly of heart disease on May 10 at the age of sixty-four. Mr. Miller was born in Cincinnati, Ohio, on March 25, 1875. He was educated at the Cincinnati Institute of Technology and the University of Cincinnati. Previous to becoming associated with the Dodge Mfg. Corporation, he had been superintendent of the Charles Williams Stores, of New York; general manager of Montgomery, Ward & Co., New York; general manager of Beaver Products Co., Buffalo, N. Y.; president of the Tillotson Mfg. Corporation, Pittsfield, Mass.; and vice-president of George W. Goethals Co., of New York. He became president of the Dodge Mfg. Corporation in 1923.

Mr. Miller took an active part in civic affairs, as well as in national organizations, such as the United States Chamber of Commerce, the Power Transmission Council, and many other associations. He is survived by his wife and four children.

ALBERT GOULD DAVIS, retired vice-president in charge of patents of the General Electric Co., died of pneumonia on April 25 at his home at 550 Park Ave., New York City, aged sixty-seven years. Mr. Davis had been connected with the General Electric Co. for more than thirty-five years, retiring in May, 1933, to engage in business as a patent attorney.

CLINTON W. HOWARD, vice-president and sales manager of the Rickert-Shafer Co., Erie, Pa., died on April 19.

ADRIAN BOYD SLOAN, secretary and treasurer of the Cushman Chuck Co., Hartford, Conn., died on April 30 at the age of fifty-seven.

COMING EVENTS

JUNE 5-6—Spring convention of the ASSOCIATED MACHINE TOOL DEALERS OF AMERICA at the Van Curler Hotel, Schenectady, N. Y. Thomas A. Fernley, Jr., 505 Arch St., Philadelphia, Pa., executive secretary.

JUNE 24-JULY 3—Ninth annual ECONOMICS CONFERENCE FOR ENGINEERS at the Stevens Engineering Camp, Johnsonburg, N. J., on the general theme of "Business and Government." For further information, address Stevens Institute of Technology, Hoboken, N. J.

JUNE 25-JULY 1—THIRTEENTH INTERNATIONAL CONGRESS OF CARBIDE, ACETYLENE, OXY-ACETYLENE WELDING AND ALLIED INDUSTRIES, to be held in Munich, Germany. Further information can be obtained from the International Acetylene Association, 30 E. 42nd St., New York City.

JUNE 26-30—Forty-second annual meeting and fifth EXHIBIT OF APPARATUS AND INSTRUMENTS of the AMERICAN SOCIETY FOR TESTING MATERIALS at Chalfonte-Haddon Hall, Atlantic City, N. J. Further information can be obtained from the secretary of the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.

JULY 10-14—Semi-annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at San Francisco, Calif. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

SEPTEMBER 4-8—Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Bldg., 29 W. 39th St., New York City. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

SEPTEMBER 20-22—Conference of the NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION, to be held at the Hotel New Yorker, New York City, under the sponsorship of the Technical Publicity Association of New York and the Industrial Marketers of New Jersey. For further information, communicate with William H. Easton, 420 Lexington Ave., New York City.

OCTOBER 15-21—Fortieth annual NATIONAL AUTOMOBILE SHOW, to be held at the Grand Central Palace, New York City. Further information can be obtained from the Automobile Manufacturers Association, General Motors Bldg., Detroit, Mich.

OCTOBER 23-27—NATIONAL METAL EXPOSITION to be held in conjunction with the annual meeting of the AMERICAN SOCIETY FOR METALS in the International Amphitheater, Chicago, Ill. W. H. Eisenman, secretary, American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.

DECEMBER 4-9—Seventeenth EXPOSITION OF CHEMICAL INDUSTRIES in the Grand Central Palace, New York City. For further information apply to Charles F. Roth, president of the International Exposition Co., Grand Central Palace, New York City.

* * *

Meeting of Elmira Chapter of A. S. T. E.

The Elmira Chapter of the American Society of Tool Engineers held its May meeting at the Hotel Langwell, Elmira, N. Y., on May 12. The feature of the evening was a talk by R. H. Rogers of the Industrial Division of the General Electric Co., Schenectady, N. Y., on the subject of "Aids to Faster and Safer Machines," illustrated by slides. Mr. Rogers showed how and why vacuum tubes and other devices perform the variety of duties required of them in radio, television, electric welding, and in the control of machines and gaging devices.

MAANDAG 27 MAART 1939 — NIEUWE ROTTERDAMSCHE COURANT — AVONDBLAD E

In Gorinchem staat een pers!

Het is de grootste op haar gebied in Nederland. Met één klap van 500.000 Kg. worden 8 mM. dikke platen van 7 Meter lengte in den gewenschten vorm gebogen. Dagelijks verricht zij haar zware werk: buigt zij groote massa's staalplaat, die door De Vries Robbé tot staalconstructies worden verwerkt.

Deze groote pers werkt o.a. voor het K.L.M.-kantoor te 's-Gravenhage. De Vries Robbé kan U helpen bij de levering van alle soorten staalconstructies en perswerken! Van álle soorten . . . groot of klein! De Vries Robbé vindt elke order belangrijk! Groote staal-voorraden - snelle montage, daardoor zeer korte levertijden!

Staal-constructies

DE VRIES ROBBÉ & Co

Gorinchem

REPRODUCED FROM A FULL PAGE ADVERTISEMENT IN THE NEW ROTTERDAM JOURNAL

A Holland fabricator advertises his 23 ft. Cincinnati Press Brake to boost business.

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS · SHEARS · BRAKES

Harwood have been connected with the company for many years and have played an active part in the development of new apparatus. B. M. HORTER has been appointed general sales manager of the company. He will have direct supervision of sales throughout the country. Mr. Horter was previously in charge of the Resale Sales Division at the Milwaukee headquarters, and has had a wide background of experience with the company.

FRANK S. O'NEIL has been appointed general manager of the Indianapolis plant of the Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. For the last seven years, Mr. O'Neil has been assistant general manager at Indianapolis. He joined the Link-Belt organization thirty-three years ago, and has been connected with the Indianapolis plant since 1916.

Frank S. O'Neil, General Manager of the Indianapolis Plant of the Link-Belt Co.

New England

FARREL-BIRMINGHAM CO., Ansonia, Conn., announces the following changes in personnel: GEORGE SCHAEFER, formerly rolling mill design engineer, has been appointed manager of the Rolling Mill Machinery Sales Division, succeeding NORMAN SHAW. Mr. Shaw has been made manager of the company's Chicago office at 1059 First National Bank Bldg. He will succeed HARRY TEMPORAL, who has been transferred to the Buffalo Division. EDWARD S. COE, who has also been connected with the Chicago office of the company, is being transferred to the Rolling Mill Machinery Sales Division in Ansonia.

WILLIAM O. LIPPMAN has been appointed works manager of the East Springfield, Mass., Works of the Westinghouse Electric & Mfg. Co. Mr. Lippman joined the Westinghouse organization in 1918, upon graduating from Pennsylvania State College. He was located in the East Pittsburgh Works until 1923 when he was transferred to the East Springfield Works as supervisor of the inspection and testing department. Previous to his present appointment, he was superintendent of the Air-Conditioning Division.

William O. Lippman, Works Manager of the East Springfield Works of the Westinghouse Electric & Mfg. Co.

W. H. C. SMITH has retired from the Construction Materials Sales Division of the General Electric Co. at Bridgeport, Conn., after nearly forty years of service. For the last three years he has been assistant to J. H. Crawford, manager of the division.

New Jersey

WORTHINGTON PUMP AND MACHINERY CORPORATION, Harrison, N. J., announces several promotions in its Harrison and Holyoke Works' staffs. L. C. RICKETTS, formerly general superintendent of the Harrison Works, has been appointed manager of that Works. W. D. SIZER has been made executive engineer in charge of all engineering activities at Harrison. B. R. MCBATH now assumes full responsibility as engineer in charge of the Centrifugal Engineering Division, succeeding Mr. Sizer. J. H. BRAUTIGAM succeeds W. H. SCHERER as manager of the Holyoke Works. Mr. Scherer will devote his entire time to the further development of manufacturing methods in all of the corporation's plants as assistant to H. C. RAMSEY, vice-president in charge of operations.

C. SCOTT WOODSIDE, illuminating engineer for the Lamp Division of the Westinghouse Electric & Mfg. Co., Bloomfield, N. J., has been elected president of the National Council of Foremen's Clubs. Mr. Woodside was one of the organizers of the Council and has served as vice-president for two years. He has been connected with the Westinghouse organization for the last sixteen years.

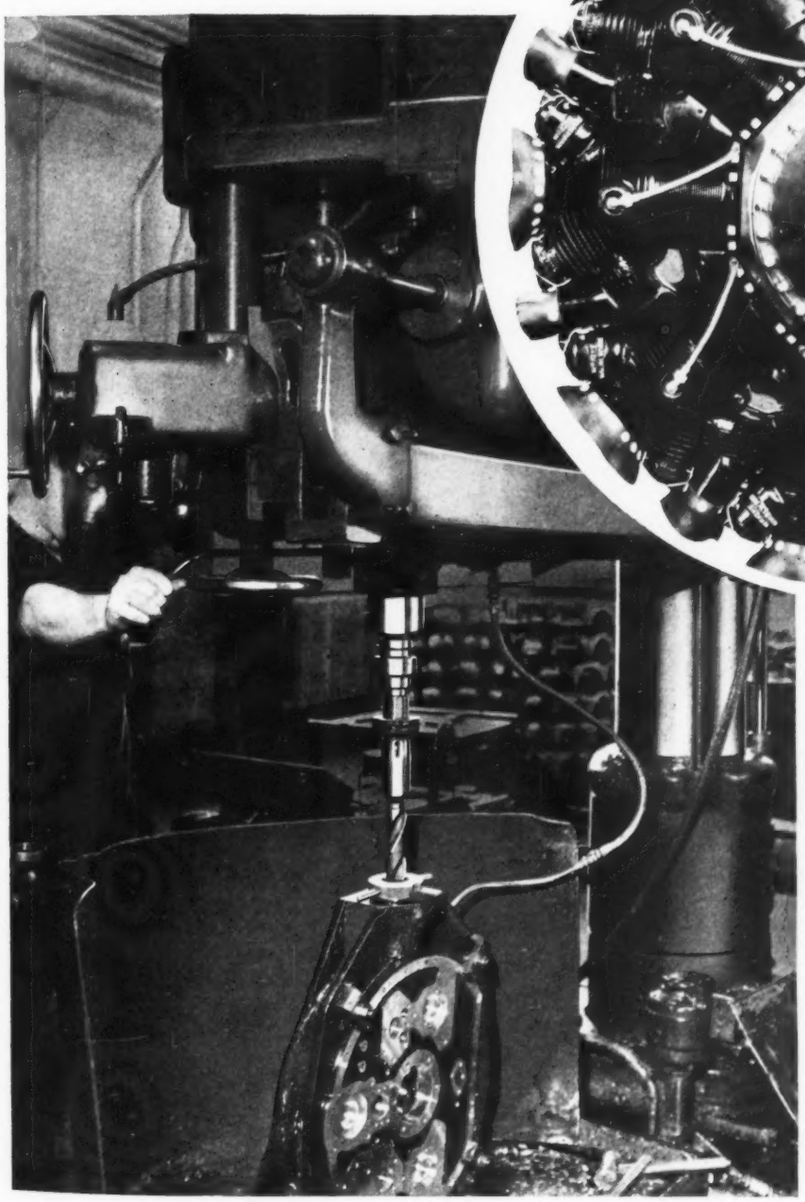
New York

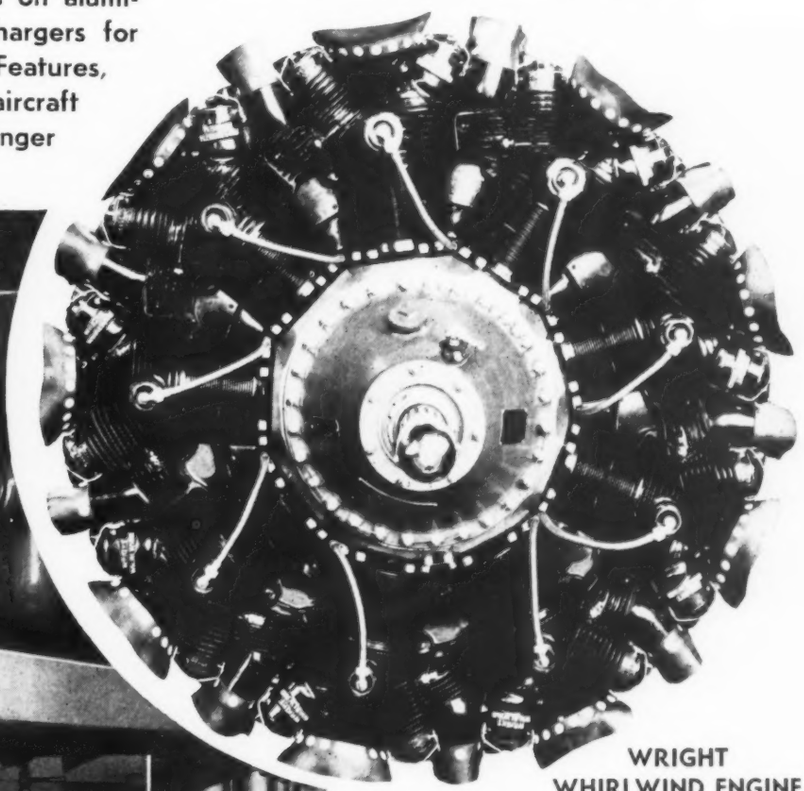
JACK LULAND recently completed sixty-six years of service with the Crucible Steel Co. of America, 405 Lexington Ave., New York City. The occasion was celebrated by a special reception and luncheon given in his honor by the executives in the offices in the Chrysler Building. Mr. Luland is connected with

Raoul E. Desvernine (Left), President of the Crucible Steel Co. of America, Congratulating Jack Luland (Center) upon the Completion of Sixty-six Years of Service with the Company, and Frank Morgan (Right), who has Completed Fifty-nine Years of Service

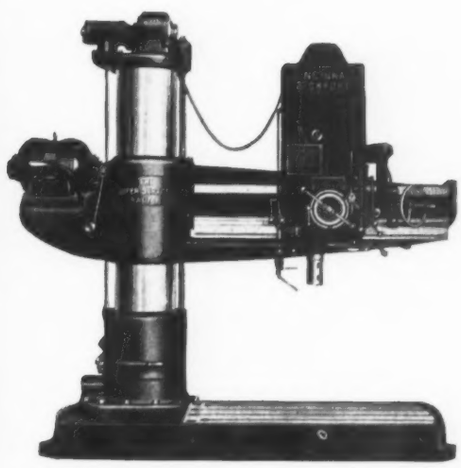
Accuracy of the Super-Service Radial

makes it particularly suited for aircraft engine production. The photograph shows the Super-Service Radial accurately drilling, spotfacing and reaming the oil strainer bosses on aluminum alloy rear covers of super chargers for the famed Wright Radial Engines. Features, applicable to industrial as well as aircraft production, are listed below. Longer life — maintained accuracy — low upkeep are explained and illustrated in Bulletin R-24. Write for your copy — no obligation.





WRIGHT
WHIRLWIND ENGINE



The SUPER-SERVICE RADIAL FEATURES

1—Low Controls conveniently centralized. 2—36 Speeds in geometric progression. 3—18 Feed changes in geometric progression. 4—Constant speed multiple disc driving clutches. 5—Herringbone gears. 6—Extra long spindle bearing for strength and accuracy. Many other features. Write for Bulletin R-24.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO. OAKLEY, CINCINNATI, OHIO, U.S.A.

the Atha Works of the company in Harrison, N. J. He was one of the first to demonstrate the proper heat-treating and advantages of high-speed steels. He has traveled all over the United States, representing the company, and once made a trip to England for a consultation on the heat-treatment of heavy projectiles. FRANK MORGAN, another employe with a remarkable record for length of service, has been connected with the company for fifty-nine years.

J. T. GILLESPIE, JR., has been appointed assistant to Thomas B. Hasler, president of the Wilson Welder and Metals Co., Inc., an affiliate of the Air Reduction Sales Co., 60 E. 42nd St., New York City. Mr. Gillespie's headquarters will be in New York City. He was formerly assistant manager of the Central Division of Railroad Sales of the Air Reduction Sales Co. in Chicago, and in his new position will handle promotional sales activities in cooperation with I. B. Yates, general sales manager of the Wilson Welder and Metals Co.

TRIPLEX MACHINE TOOL CORPORATION, 125 Barclay St., New York City, dealer in machinery and tools, has opened a large machinery show room at 106 Lafayette St., New York City, for the purpose of showing a variety of new machines in operation. Power lines have been installed, so that the machines can be demonstrated under their own power.

LOGANSPORT MACHINE, INC., Logansport, Ind., manufacturer of a complete line of air and hydraulic equipment, including arbor presses, chucks, milling and drilling fixtures, valves, vises, etc., announces the appointment of BENJAMIN WHITTAKER, INC., 114-118 Liberty St., New York City, as export agent.

AMERICAN ENGINEERING CO., Philadelphia, Pa., manufacturer of Lo-Hed monorail electric hoists, has appointed the A. C. COOPER SALES CO., 220 E. 42nd St., New York City, sales representative for the company in the metropolitan New York, Long Island, and northern New Jersey districts.

U. A. WHITTAKER, research director of the American Machine & Foundry Co., Brooklyn, N. Y., has been elected a member of the Industrial Research Institute, Engineering Societies Bldg., 29 W. 39th St., New York City, an affiliate of the National Research Council.

J. ANTHONY GARRITY, well known as a designer in automotive and motion picture circles, has been appointed designer for the Eastern Division of Designers for Industry, Inc., Rockefeller Center, 630 Fifth Ave., New York City.

ATLANTIC BRASS & COPPER CO., wholesale jobbers of metals, have removed their office and warehouse from 593 Broadway, New York City, to 73 Warren St., New York.

M. H. AVRAM has been made director of the recently organized engineering department of Designers for Industry, Inc., Rockefeller Center, 630 Fifth Ave., New York City. W. JOHN PRICE will be assistant to Mr. Avram.

GENERAL ELECTRIC VAPOR LAMP CO., Hoboken, N. J., has been merged with the Incandescent Lamp Department of the General Electric Co. at Schenectady, N. Y.

Pennsylvania

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa., has established a new fellowship for graduate study in metallurgy at the Carnegie Institute of Technology. The fellowship will continue for a three-year period and will provide $1200 a year to the recipient for graduate study and research in metallurgy. FREDERICK C. HULL, of Ann Arbor, Mich., a graduate of the University of Michigan in 1937, has been selected as the first Fellow under the plan. During 1939 and 1940 he will continue the studies in reactions of steel that he has been pursuing for the last two years as a teaching assistant in the Department of Metallurgy. In addition to the Westinghouse award, similar fellowships have been recently established at the Institute by the International Nickel Co., the Aluminum Co. of America, the Molybdenum Corporation of America, and the Unitcast Corporation.

MORRIS E. LEEDS, founder and president of the Leeds & Northrup Co., 4911 Stenton Ave., Philadelphia, Pa., manufacturer of electric measuring instruments, automatic controls, and electric heat-treating furnaces, has assumed the position of chairman of the board of directors. CHARLES S. REDDING, vice-president in charge of research and engineering, becomes president.

Lester M. Curtiss, Who has Just been Appointed General Superintendent of the Lukens Steel Co.

LESTER M. CURTISS, formerly assistant general superintendent of the Lukens Steel Co., Coatesville, Pa., has been appointed general superintendent in charge of all operations of the company. He succeeds G. DONALD SPACKMAN, who has been granted a leave of absence at his own request in the interest of his health. Mr. Spackman will continue to serve the company in an advisory capacity, and will resume active duty when his health permits. Mr. Curtiss joined the company in 1919 as assistant engineer of tests, and has steadily advanced from that time on.

RICHARD P. BROWN, chairman of the board of the Brown Instrument Co., Philadelphia, Pa., and vice-president of the Minneapolis-Honeywell Regulator Co., has been appointed first secretary of the new Department of Commerce of the Commonwealth of Pennsylvania by Governor James. Mr. Brown has been

Morris E. Leeds, Chairman of the Board, Leeds & Northrup Co.

©Harris & Ewing

Charles S. Redding, New President of Leeds & Northrup Co.

HOW TO GET GREATER ACCURACY AND SMOOTHER FINISH FROM YOUR PRESENT O. D. GRINDING EQUIPMENT . . .

Improved Ex-Cell-O Machine Laps Work Centers Quickly and Inexpensively

Female centers, in parts held between centers and ground on the outside diameter, are easily and economically lapped on the improved Ex-Cell-O Center Lapping Machine. Parts with true, smooth centers can more readily be ground straight, round, concentric, and with good finish.

•

The machine has ample capacity, lapping 60° centers up to 15/16" diameter in parts up to 10" diameter, 36" long (or, with a special column, 84" long). Lapping speeds are 700, 1300, 2500 and 4650 r.p.m.

•

Lapping stones are mounted on an Ex-Cell-O Precision Ball Bearing Spindle, which has minimum end and radial play, does not generate excessive heat, and will stand up without replacement or adjustment.

•

Many other features of the Ex-Cell-O Center Lapping Machine are fully described in Bulletin No. 20783, which also gives complete specifications. Write for a copy.

XLO

EX-CELL-O CORPORATION
1212 Oakman Blvd., Detroit

EX-CELL-O MACHINES for **Precision** AND TOOLS for

CENTER LAPPING • TURNING • TOOL GRINDING • BORING • FACING
REAMING • DRILLING • THREAD GRINDING • COUNTERBORING

SURFACE GRINDING • COUNTERBORING • FACING • MILLING • TURNING
BROACHING • FORMING • BORING • INTERNAL GRINDING • REAMING

interested for some years in the Industrial development of Pennsylvania with the object of increasing the number of jobs in private industry, thus reducing the relief load and the taxes necessary to support those on relief.

DAVID R. CALHOUN has been appointed manager of the Industrial Division of the Wilkening Mfg. Co., Philadelphia, Pa., manufacturer of the Pedrick heat-shaped piston-rings. During the last two years, Mr. Calhoun has been responsible particularly for service engineering in connection with field sales. He will be succeeded in that position by WEBB PEDRICK.

FIRTH-STERLING STEEL CO., McKeesport, Pa., announces that it has recently acquired the AMERICAN CARBIDE ALLOYS CORPORATION, of Lewistown, Me., and Detroit, Mich., together with the exclusive United States rights for the manufacture of "Cutanit," a cemented titanium carbide alloy used extensively in making cutting tools for armament production.

AJAX STEEL & FORGE CO., 205 Adair St., Detroit, Mich., has appointed the JACKSON-ALDEN ASSOCIATES, Lincoln-Liberty Bldg., Philadelphia, Pa., representative of the company in eastern Pennsylvania, eastern New York, New Jersey, Delaware, Maryland, and Washington, D. C.

LUKENS STEEL CO., Coatesville, Pa., has recently been licensed to produce lead-bearing steels under the Inland Steel Co.'s Ledloy patents.

NEW BOOKS AND PUBLICATIONS

SIMPLE BLUEPRINT READING (With Particular Reference to Welding and Welding Symbols of the American Welding Society). 140 mimeographed pages, 8 1/2 by 11 inches. Distributed by the Lincoln Electric Co., Cleveland, Ohio. Price, 50 cents in the U. S.; 75 cents elsewhere.

This book has been compiled primarily for welders, but it contains information of value to anyone concerned with mechanical construction. The aim is to provide instruction in the reading of blueprints and drawings, giving the student a clear idea of the various lines, symbols, and other markings that the draftsman employs to convey his ideas. It also explains the various symbols used on drawings of different types of welded joints. There are 85 examples of drawings included. A list of questions and answers is given that permits the student to test his knowledge.

MACHINE DESIGN. By Stanton E. Winston. 326 pages, 5 1/2 by 8 1/2 inches; 145 illustrations and 26 tables. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price, $3.

The author of this book, who is associate professor of mechanical engineering at the Armour Institute of Technology, has attempted, in this book, to present material that is basic in the field of machine design and that will familiarize the student with the general idea of analysis which applies to the entire field of design. The book is intended for students having a mathematical training extending through trigonometry and logarithms, but does not require a knowledge of calculus. Briefly, the book covers simple and compound stresses; bolts and screws; cylinders and riveted joints; shafting and keys; couplings and clutches; belts, pulleys, sheaves, chains and sprockets; friction drives; and gearing.

PERSONNEL AND INDUSTRIAL RELATIONS. By J. E. Walters and R. J. Greenly. 133 pages, 6 by 9 inches. Published as Extension Series No. 43 by the Engineering Extension Division, Purdue University, Lafayette, Ind.

* * *

Machinery Builder Reports Marked Business Improvement

A 41 per cent increase in sales during the first six months of 1939, as compared with the same period in 1938, is reported by the Porter-Cable Machine Co., Syracuse, N. Y. This increase, which is the more significant since the company has not gone into any new territories or developed any new lines of equipment, except new models of its regular lines, has been aided materially by more efficient and effective sales work and a more aggressive advertising campaign.

* * *

British Machine Tool Exhibition Postponed

Word has come from the Machine Tool Trades Association of London, England, that the Machine Tool Exhibition which was to be held at Olympia, London, England in April, 1940, has been postponed, due to the extreme pressure for deliveries of machine tools for the Defense Program.

COMING EVENTS

AUGUST 30-SEPTEMBER 2 — Twenty-second INDUSTRIAL CONFERENCE, dealing with "Better Industrial Relations through Better Understanding" at Silver Bay, Lake George, N. Y. For further information, address Silver Bay Industrial Conference Committee, 347 Madison Ave., New York City.

SEPTEMBER 4-8—Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Engineering Societies Bldg., 29 W. 39th St., New York City. Clarence E. Davies, secretary, 29 W. 39th St., New York City.

SEPTEMBER 20-22—Conference of the NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION, to be held at the Hotel New Yorker, New York City, under the sponsorship of the Technical Publicity Association of New York and the Industrial Marketers of New Jersey. For further information, communicate with William H. Easton, 420 Lexington Ave., New York City.

SEPTEMBER 28-29—Tractor meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Hotel Schroeder, Milwaukee, Wis. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

OCTOBER 4-13—NATIONAL MACHINE TOOL BUILDERS' EXPOSITION in Cleveland, Ohio. General Manager, Tell S. Berna, 10525 Carnegie Ave., Cleveland.

OCTOBER 5-7—National aircraft production meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Ambassador Hotel, Los Angeles, Calif. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

OCTOBER 15-21—Fortieth annual NATIONAL AUTOMOBILE SHOW, to be held at the Grand Central Palace, New York City. Further information can be obtained from the Automobile Manufacturers Association, General Motors Bldg., Detroit, Mich.

OCTOBER 23-27—NATIONAL METAL EXPOSITION to be held in conjunction with the annual meeting of the AMERICAN SOCIETY FOR METALS in the International Amphitheater, Chicago, Ill. W. H. Eisenman, secretary, American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.

DECEMBER 4-8—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Bellevue-Stratford Hotel, Philadelphia, Pa. C. E. Davies, secretary, 29 W. 39th St., New York City.

MACHINERY'S DATA SHEETS 377 and 378

PROPERTIES OF MEEHANITE CASTINGS—3

Heat-Resisting Castings

H A. *Temperatures up to 1200 Degrees F.*—This is a free-machining material having a tensile strength up to 50,000 pounds per square inch and a Brinell hardness ranging from 196 to 240. It is a tough, dense metal which maintains some strength at temperatures up to 950 degrees F. It is non-growing up to temperatures of 1200 degrees F. It withstands high pressures and resists penetration of steam and gases up to 1000 degrees F. without deterioration. Typical installations are: Diesel castings, burner parts, valves, dies, liners, steel guides, manifolds, etc.

H R. *Temperatures up to 1550 Degrees F.*—This is a hard-machining material requiring the use of special high-speed or tungsten-carbide tools. It has a tensile strength of 40,000 pounds per square inch and a Brinell hardness range of 300 to 400. It is a strong, dense, abrasion-resisting metal of high rigidity. It is non-growing up to 1550 degrees F. and highly resistant to scaling. Typical installations are: Furnace and burner parts, pedestals, gas retort parts, stoker parts, sugar retorts, furnace skid castings, roasting furnace stirrer blades, blast furnace blowpipes, grate bars, boiler tube armor, annealing furnace rails, and tempering tanks.

H B. *Temperatures up to 1600 Degrees F.*—This material is machineable with tungsten-carbide tools, has a Brinell hardness of 350 to 500 and tensile strength up to 83,000 pounds per square inch. It is a hard, dense, abrasion-resisting metal, non-growing up to 1600 degrees F. and is recommended where labor costs of installation are high and long life is essential. The carbides in this iron are stabilized to prevent deterioration and scaling. Typical installations include: Stoker dead plates, furnace skid castings, furnace lips, incinerator liners, stoker extension grates, stoker tuyeres, oil burner cones, furnace rolls, sugar retorts, and furnace door jambs.

S C. *Temperatures up to 1650 Degrees F.*—This material is machineable at medium speeds and feeds. The tensile strength ranges to 27,000 pounds per square inch and the Brinell hardness is from 200 to 300. It is recommended for applications where temperatures are fairly constant. This material does not grow at temperatures up to 1650 degrees F. and scales very slowly. Typical installations are: Annealing boxes, carburizing boxes, baffle plates, furnace slides, annealing furnace plates, carburizing retorts, furnace rails, annealing cylinders special fire grates, etc.

H E. *Intermittent Temperatures*—This is a free-machining material having a Brinell hardness rating of 170 to 220 and a tensile strength up to 30,000 pounds per square inch. It is recommended for castings which are alternately heated and cooled with resultant expansion and contraction, such as causes mechanical deterioration and breakdown of ordinary iron castings. Typical applications of this material are: Furnace castings, slag pots, ingot molds and stools, retorts, fittings for steam lines, hot gas valves, acid pots and lead pots, etc.

MACHINERY'S Data Sheet No. 377, New Series, September, 1938

Based on Compilations by the Meehanite Metal Corporation, Pittsburgh, Pa.

PROPERTIES OF MEEHANITE CASTINGS—4

Corrosion-Resisting Castings

C B 3. *For Resisting Corrosion from Concentrated Acid*—The tensile strength of this material ranges up to 45,000 pounds per square inch. The Brinell hardness is 197. This material gives excellent service in sulphuric acid and other plants where 93 1/2, 98 1/2 and 105 per cent sulphuric acid is encountered at temperatures up to 200 degrees F. It is recommended for use in pumps, valves and fittings, etc.

C B. *For Resisting Corrosion from Acids and Chemicals*—This material is free machining, has a tensile strength of 45,000 pounds per square inch and a Brinell hardness of 187 and upward, as required. It is intended for use in installations handling the following materials:

Acetic Acid
Acetic Anhydride
Acetone
Aluminum Chloride
Ammonia
Ammonium Soda Alkalies
Ammonium Chloride
Ammonium Hydroxide
Ammonium Nitrate
Ammonium Phosphate
Ammonium Sulphate
Amyl Acetate
Amyl Chloride
Beet Sugar
Butanol
Butyl Acetate
Calcium Chloride
Calcium Hypochlorite
Cane Sugar Refineries
Carbon Bisulphide
Carbon Tetrachloride
Carbonic Acid
Caustic Soda
Chromic Acid
Ethyl Acetate
Fatty Acids
Formaldehyde
Hydrogen Peroxide
Iodine
Magnesium Chloride
Magnesium Sulphate
Methanol
Napthalene
Phenol
Potassium Chloride
Sea Water and Brine
Sodium Carbonate
Sodium Chromate
Sodium Hydroxide
Sodium Phosphate
Sodium Sulphide
Stearic Acid
Sulphuric Acid (very dilute and concentrated only)
Tannic Acid
Hydrocarbons
Hydrogen Sulphide
Oxides of Nitrogen
Oxidizing and Reducing Atmospheres
Sulphur Dioxide
Carbolic Acid
Boric Acid
Ethyl Chloride
Sodium Chloride
Sodium Silicate
Turpentine

Typical installations include: Acid pans, kettles, pumps, valves, fittings, evaporators, condensers, retorts, filter presses, stills, reaction vessels, etc.

K C. *For Resisting Corrosion from Alkalies*—This is an unusually dense and tough machineable metal, recommended for pumps, valves and fittings, carbonators, causticizers, evaporators, and pots.

C B. *For Resisting Corrosion in Oil Refineries*—This material is used for:

Dephlegmator Pans
Pumps
Pistons
Valves
Bubble Trays and Caps
Tube Supports
Down Flow Pipes and Baffles

C C. *For Resisting Atmospheric Corrosion*—This material is recommended for use where longer service life than that obtainable from cast iron and steel is required.

MACHINERY'S Data Sheet No. 378, New Series, September, 1938

Based on Compilations by the Meehanite Metal Corporation, Pittsburgh, Pa.

STANDARD TOLERANCES FOR FORGINGS—1

Based on Standard Tolerances Adopted by the Drop Forging Association, February 11, 1937, for Forgings under 100 Pounds

Tolerances shall be either "special" or "regular."

Special Tolerances are tolerances particularly noted as "special" in the specifications. Any or all special tolerances may be applied in any way conditions require. Special tolerances apply only to the particular dimension or thing noted. Where special tolerances are not specified, regular tolerances shall apply.

Regular Tolerances are divided into two groups, designated "commercial standard" and "close standard." Commercial standard tolerances are for general forging practice, but when extra close work is desired, involving additional expense and care in the production of forgings, "close standard" tolerances may be specified. Close standard tolerances may be specified for one or more of the following classes, but when no standard is specified, commercial standard shall apply.

Classes to which Regular Tolerances are Applied

1. Thickness
2. Width and Length
   - (a) Shrinkage and Die Wear
   - (b) Mismatching
   - (c) Trimmed Size
3. Draft Angle
4. Quantity
5. Fillets and Corners

Class 1 — Thickness Tolerances

Thickness tolerances shall apply to the over-all thickness of a forging. In the case of drop-hammer forgings, they shall apply to the thickness in a direction perpendicular to the main or fundamental parting plane of the die. In the case of upset forgings, they shall apply to the thickness in a direction parallel to the direction of travel of the ram, but only to such dimensions as are enclosed by and actually formed by the die.

Table 1. Thickness Tolerances, Inches

Net Weights, Pounds	Commercial		Close		Net Weights, Pounds	Commercial		Close	
	−	+	−	+		−	+	−	+
0 up to 0.2	0.008	0.024	0.004	0.012	10 to 20	0.026	0.078	0.013	0.039
0.2 to 0.4	0.009	0.027	0.005	0.015	20 to 30	0.030	0.090	0.015	0.045
0.4 to 0.6	0.010	0.030	0.005	0.015	30 to 40	0.034	0.102	0.017	0.051
0.6 to 0.8	0.011	0.033	0.006	0.018	40 to 50	0.038	0.114	0.019	0.057
0.8 to 1.0	0.012	0.036	0.006	0.018	50 to 60	0.042	0.126	0.021	0.063
1.0 to 2.0	0.015	0.045	0.008	0.024	60 to 70	0.046	0.138	0.023	0.069
2.0 to 3.0	0.017	0.051	0.009	0.027	70 to 80	0.050	0.150	0.025	0.075
3.0 to 4.0	0.018	0.054	0.009	0.027	80 to 90	0.054	0.162	0.027	0.081
4.0 to 5.0	0.019	0.057	0.010	0.030	90 to 100	0.058	0.174	0.029	0.087
5.0 to 10.0	0.022	0.066	0.011	0.033	—	—	—	—	—

STANDARD TOLERANCES FOR FORGINGS—2

Based on Standard Tolerances Adopted by the Drop Forging Association, February 11, 1937, for Forgings under 100 Pounds

Class 2 — Width and Length Tolerances

Width and length tolerances shall be alike and shall apply to the width or length, or both the width and length of a forging. In the case of drop-hammer forgings, they shall apply to the width or length in a direction parallel to the main parting plane of the die, but only to such dimensions as are enclosed by and actually formed by the die. In the case of upset forgings, they shall apply to the width or length in a direction perpendicular to the direction of travel of the ram. These tolerances shall consist of three subdivisions:

Class 2. (a) Shrinkage and Die Wear Tolerance

Class 2. (b) Mismatching Tolerance

Class 2. (c) Trimmed Size Tolerance

Class 2 (a) — Shrinkage and Die Wear

Shrinkage and die wear tolerances shall apply to that part of the forging formed by a single die-block only. They shall not apply to any dimension crossing the parting plane. They shall be the sum of the shrinkage tolerances and the die wear tolerances as given in Table 2. The shrinkage tolerances and die wear tolerances shall not be applied separately, but shall only be used as the sum of the two. They shall not be so applied as to include draft or variation thereof.

Table 2. Shrinkage and Die Wear, Inches

Shrinkage			Die Wear		
Lengths or Widths, Inches	Commercial + or −	Close + or −	Net Weights, Pounds	Commercial + or −	Close + or −
0 to 1	0.003	0.002	0 to 1	0.032	0.016
1 to 2	0.006	0.003	1 to 3	0.035	0.018
2 to 3	0.009	0.005	3 to 5	0.038	0.019
3 to 4	0.012	0.006	5 to 7	0.041	0.021
4 to 5	0.015	0.008	7 to 9	0.044	0.022
5 to 6	0.018	0.009	9 to 11	0.047	0.024
For Each Additional Inch, Add	0.003	0.0015	For Each Additional 2 Pounds, Add	0.003	0.0015
For example:			For example:		
11 to 12	0.036	0.018	19 to 21	0.062	0.031
17 to 18	0.054	0.027	29 to 31	0.077	0.039
23 to 24	0.072	0.036	39 to 41	0.092	0.046
35 to 36	0.108	0.054	49 to 51	0.107	0.054
47 to 48	0.144	0.072	69 to 71	0.137	0.069
59 to 60	0.180	0.090	89 to 91	0.167	0.084

STANDARD TOLERANCES FOR FORGINGS—3

Based on Standard Tolerances Adopted by the Drop Forging Association, February 11, 1937, for Forgings under 100 Pounds

Class 2 (b)—Mismatching Tolerances

Mismatching is the displacement of a point in that part of a forging formed by one die-block of a pair, from its desired position when located from the part of the forging formed in the other die-block. Mismatching does not include any displacement caused by variation in thickness of the forging, but is only the displacement in a plane parallel to the main or fundamental parting plane of the dies.

Mismatching tolerances are independent of, and in addition to, any other tolerances. These tolerances are given in Table 3.

Class 2 (c)—Trimmed Size Tolerances

The trimmed size shall not be greater nor less than the limiting sizes at the parting plane imposed by the sum of the draft angle tolerances and the shrinkage and die wear tolerances.

Class 3—Draft Angle Tolerances

Draft angle tolerances are the permissible variations from the standard or nominal angle of draft.

Table 3. Mismatching Tolerances, Inches

Net Weight, Pounds	Commercial	Close
0 to 1	0.015	0.010
1 to 7	0.018	0.012
7 to 13	0.021	0.014
13 to 19	0.024	0.016
For Each Additional 6 Pounds, Add	0.003	0.002
For example:		
31 to 37	0.033	0.022
49 to 55	0.042	0.028
73 to 79	0.054	0.036
91 to 97	0.063	0.042

Table 4. Draft Angle Tolerances for Drop-Hammer Forgings, Degrees

	Nominal Angle	Commercial	Close
Outside ...	7	0 to 10	0 to 8
Inside holes and depressions	10	0 to 13	.....
	7	.....	0 to 8

Draft Angle Tolerances for Upset Forgings, Degrees

	Nominal Angle	Commercial	Close
Outside ...	3	0 to 5	0 to 4
Inside holes and depressions	5	0 to 8	0 to 7

STANDARD TOLERANCES FOR FORGINGS—4

Based on Standard Tolerances Adopted by the Drop Forging Association, February 11, 1937, for Forgings under 100 Pounds

Class 4—Quantity Tolerances

Quantity tolerances shall be the permissible over- or under-run allowed for each release or part shipment of an order. Any shipping quantity within the limits of over- and under-run shall be considered as completing the order. Commercial and close tolerances shall be the same amounts.

Class 5—Fillet and Corner Tolerances

Fillet and corner tolerances apply to all meeting surfaces, even though drawings or models (or both drawings and models) indicate sharp corners, unless such drawings or models have or indicate (even though actual dimensions are not specified) fillet or corner dimensions of larger radii than the following standards, in which case such actual or indicated larger dimensions shall be considered as specified and the tolerances shall be "Special Tolerances."

Fillet tolerances apply to inside corners and edges in all cases in which surfaces meet at an angle less than 180 degrees.

Corner tolerances apply to outside corners and edges in all cases in which surfaces meet at an angle greater than 180 degrees.

Where a corner tolerance applies on the meeting of two drafted surfaces, the tolerance shall apply to the narrow end of such meeting and the radius will increase toward the wide end. The total increase in the radius will equal the length of the drafted surface, in inches, multiplied by the tangent of the nominal draft angle.

The radii of fillets and corners may be any value not greater than those given in Table 6.

Table 5. Quantity Tolerances

Number of Pieces on Order	Over-run, Pieces	Under-run, Pieces	Number of Pieces on Order	Over-run, Per Cent	Under-run, Per Cent
1 to 2	1	0	100 to 199	10	5.0
3 to 5	2	1	200 to 299	9	4.5
6 to 19	3	1	300 to 599	8	4.0
20 to 29	4	2	600 to 1249	7	3.5
30 to 39	5	2	1250 to 2999	6	3.0
40 to 49	6	3	3000 to 9999	5	2.5
50 to 59	7	3	10,000 to 39,999	4	2.0
60 to 69	8	4	40,000 to 299,999	3	1.5
70 to 79	9	4	300,000 and up	2	1.0
80 to 99	10	5	..	..	...

Table 6. Fillet and Corner Tolerances, Radii in Inches

Net Weight, Pounds	Commercial	Close	Net Weight, Pounds	Commercial	Close
0 to 0.3	3/32	3/64	3 to 10	3/16	3/32
0.3 to 1.0	1/8	1/16	10 to 30	7/32	7/64
1.0 to 3.0	5/32	5/64	30 to 100	1/4	1/8

MACHINERY'S DATA SHEETS 383 and 384

CAUSES AND CURES OF ARC-WELDING TROUBLES—1

Trouble	Cause	Cure
Distortion	Shrinkage of deposited metal pulls the parts together and changes relative positions. Non-uniform heating of parts during welding causes them to distort before welding is finished. Final welding of parts in distorted position prevents the maintenance of proper dimensions. Improper welding sequence.	Properly clamp or tack parts to resist shrinkage. Separate or pre-form parts sufficiently to compensate for shrinkage of welds. Distribute welding to prevent excessive local heating. Preheating desirable in some heavy structures. Removal of rolling or forming strains before welding is sometimes helpful. Study structure and develop a definite sequence of welding.
Warping (Thin Plates)	Shrinkage of deposited weld metal. Excessive local heating at the joint. Improper preparation of joint. Improper welding procedure. Improper clamping of parts.	Select electrode with high welding speed and moderate penetrating properties. Weld rapidly to prevent excessive local heating of the plates adjacent to the weld. Do not have excessive spaces between the parts to be welded. Properly clamp parts adjacent to the joint. Use back-up to cool parts rapidly. Use special welding sequence; step back or skip procedure. Hammer joint edges thinner than rest of plate before welding. This elongates edges and the weld shrinkage causes them to pull back to the original shape.
Welding Stresses	Joints too rigid. Improper welding procedure. Stresses inherent in all welds, especially in heavy parts.	Slight movement of parts during welding will reduce welding stresses. Make weld in as few passes as practical. Peen each deposit of weld metal. Anneal finished product at 1100 to 1200 degrees F. for one hour per inch of thickness. Develop welding procedure that permits all parts to be free to move as long as possible.

MACHINERY'S Data Sheet No. 383, December, 1938 Compiled by Westinghouse Electric & Mfg. Co.

CAUSES AND CURES OF ARC-WELDING TROUBLES—2

Trouble	Cause	Cure
Spatter	Inherent property of some electrodes. Excessive welding current for the type or diameter of electrode used. Coated electrodes produce larger spalls than bare type electrodes.	Select proper type of electrode. Do not use excessive welding current. Paint parts adjacent to weld with whitewash. This prevents spalls from welding to parts, and they can be removed easily.
Cracked Welds	Joint too rigid. Welds too small for size of parts joined. Improper welding procedure. Poor welds. Improper preparation of joints.	Design the structure and develop a welding procedure to eliminate rigid joints. Do not use too small a weld between heavy plates. Increase the size of welds. Do not make welds in string beads. Make weld full size in short section 8 to 10 inches long. Welding sequence should be such as to leave ends free to move as long as possible. Be sure welds are sound and the fusion is good. Preheating parts to be welded is sometimes helpful. Prepare joints with a uniform and proper free space. In some cases, a free space is essential. In other cases, a shrink or press fit may be required.
Poor Weld Appearance	Poor welding technique — improper current or electrode manipulation. Inherent characteristic of electrode used. Welding in improper position for which electrode is designed. Improper joint preparation.	Insure the use of the proper welding technique for the electrode used. Use an electrode designed for the type of weld and the position in which the weld is to be made. Do not make fillet welds with downhand type electrodes unless the parts are positioned. Do not use excessive welding currents. Use a uniform weave or rate of travel at all times. Prepare all joints properly.

MACHINERY'S Data Sheet No. 384, December, 1938 Compiled by Westinghouse Electric & Mfg. Co.

MACHINERY'S DATA SHEETS 385 and 386

CAUSES AND CURES OF ARC-WELDING TROUBLES—3

Trouble	Cause	Cure
Under-cut	Excessive welding current. Improper manipulation of electrode. Attempting to weld in a position for which the electrode is not designed.	Use a moderate welding current and do not try to weld too rapidly. Do not use too large an electrode. If the puddle of molten metal becomes too large, under-cut may result. Excessive weaving will cause under-cut. A uniform weave will aid greatly in preventing under-cut in butt welds. If the electrode is held too near the vertical plane when making a horizontal fillet weld, under-cut will be produced on the vertical plate.
Poor Fusion	Improper diameter of electrode. Improper welding current. Improper welding technique. Improper preparation of joint.	When welding in narrow vees, use an electrode small enough to reach the bottom. Use sufficient welding current to deposit the metal and penetrate into the plates. Heavier plates require more current for a given electrode than light plates. Be sure the weave is wide enough to melt the sides of a joint thoroughly. The deposited metal should tend to sweat on the plates and not curl away from them.
Incomplete Penetration	Improper preparation of joint. Use of too large an electrode. Insufficient welding current. Too fast a welding speed.	Be sure to allow the proper free space at the bottom of a weld. Do not expect excessive penetration from an electrode. Use small-diameter electrodes in a narrow welding groove. Use sufficient welding current to obtain proper penetration. Do not weld too rapidly. Use a back-up bar if possible. Chip or cut out the back of the joint and deposit a bead of weld metal at this point.

MACHINERY'S Data Sheet No. 385, January, 1939 — Compiled by Westinghouse Electric & Mfg. Co.

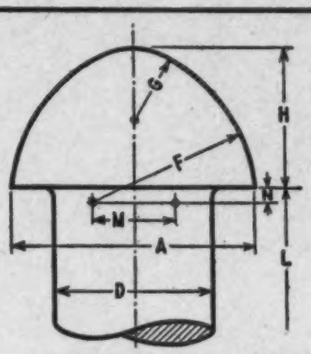
CAUSES AND CURES OF ARC-WELDING TROUBLES—4

Trouble	Cause	Cure
Porous Welds	Inherent properties of electrodes. Improper welding procedure. Not sufficient puddling time to allow entrapped gas to escape. Poor base metal.	Some electrodes inherently produce sounder welds than others. Be sure the proper electrodes are used. Puddling keeps the weld metal molten longer and often insures sounder welds. A weld made of a series of strung beads is likely to contain minute holes. Weaving will often eliminate this trouble. Do not use excessive welding currents. In some cases, the base metal may be at fault. Check this for segregations and impurities.
Brittle Welds	Unsatisfactory electrode. Excessive welding current, causing coarse-grained and burnt metal. High-carbon or alloy base metal which has not been taken into consideration.	Bare type electrodes produce brittle welds. Shielded-arc type electrodes must be used if ductile welds are required. Do not use excessive welding current, as this may cause coarse grain structure and oxidized deposits. A single-pass weld may be more brittle than a multiple-layer weld, because it has not been refined by successive layers of weld metal. Welds may absorb alloy elements from the parent metal and become hard. Do not weld a steel unless the analysis and characteristics are known.
Brittle Joints	Air-hardening base metal. Improper welding procedure. Unsatisfactory electrode.	When welding on medium carbon steel or certain alloy steels, the fusion zone may be hard as a result of rapid cooling. Preheating at 300 to 500 degrees F. should be resorted to before welding. Multiple-layer welds will tend to anneal hard zones. Annealing at 1100 to 1200 degrees F. after welding will generally reduce hard areas formed during welding. The use of austenitic electrodes will often work on special steels, but the fusion zone will generally contain an alloy that is hard.

MACHINERY'S Data Sheet No. 386, January, 1939 — Compiled by Westinghouse Electric & Mfg. Co.

AMERICAN STANDARD LARGE RIVETS—2

High Button Head (Acorn)—Manufactured Shape



All dimensions given in inches.

Proportions (Basic): A = 1.50D + 0.031; H = 0.75D + 0.125; F = 0.75D + 0.281; G = 0.75D − 0.281; M = 0.50; N = 0.094.

The length (L) is measured from the largest diameter of the bearing surface of the head to the point or end.

Rivets with fillets under the head of not more than 1/16 inch in radius are acceptable.

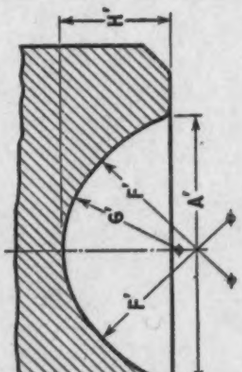
Diameter of Body D			Diameter of Head A			Height of Head H			Radii of Head		Centers for Head Radii	
Nominal	Max	Min	Basic	Max	Min	Basic	Max	Min	F	G	M	N
½ 0.500	0.520	0.478	0.781	0.844	0.750	0.500	0.531	0.484	0.656	0.094	0.500	0.094
⅝ 0.625	0.655	0.600	0.969	1.032	0.938	0.594	0.625	0.578	0.750	0.188	0.500	0.094
¾ 0.750	0.780	0.725	1.156	1.234	1.125	0.688	0.719	0.657	0.844	0.282	0.500	0.094
⅞ 0.875	0.905	0.850	1.344	1.422	1.313	0.781	0.812	0.750	0.937	0.375	0.500	0.094
1 1.000	1.030	0.975	1.531	1.609	1.500	0.875	0.906	0.844	1.031	0.469	0.500	0.094
1 ⅛ 1.125	1.160	1.098	1.719	1.813	1.688	0.969	1.016	0.938	1.125	0.563	0.500	0.094
1 ¼ 1.250	1.285	1.223	1.906	2.000	1.875	1.063	1.110	1.032	1.219	0.657	0.500	0.094
1 ⅜ 1.375	1.415	1.345	2.094	2.188	2.063	1.156	1.203	1.125	1.312	0.750	0.500	0.094
1 ½ 1.500	1.540	1.470	2.281	2.375	2.250	1.250	1.313	1.219	1.406	0.844	0.500	0.094
1 ⅝ 1.625	1.665	1.588	2.469	2.563	2.438	1.344	1.407	1.313	1.500	0.938	0.500	0.094
1 ¾ 1.750	1.790	1.713	2.656	2.765	2.625	1.438	1.501	1.407	1.594	1.032	0.500	0.094

MACHINERY'S Data Sheet No. 389, March, 1939

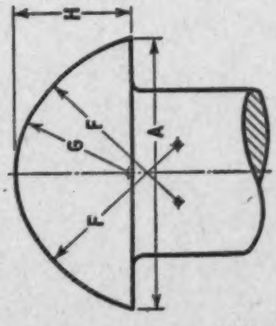
Approved by American Standards Association, March, 1937

AMERICAN STANDARD LARGE RIVETS—3

High Button Head (Acorn)



HOLD-ON (DOLLY BAR), ALSO RIVET SET IMPRESSION



MANUFACTURED HEAD AFTER DRIVING, ALSO DRIVEN HEAD

Body Diameter of Rivet D	Manufactured Head after Driving and Driven Head				Hold-On (Dolly Bar) and Rivet Set			
	A	H	F	G	A'	H'	F'	G'
½ 0.500	0.875	0.375	0.563	0.375	0.859	0.359	0.563	0.375
⅝ 0.625	1.063	0.453	0.672	0.453	1.047	0.422	0.672	0.453
¾ 0.750	1.250	0.531	0.797	0.531	1.234	0.500	0.797	0.531
⅞ 0.875	1.438	0.609	0.922	0.609	1.422	0.578	0.922	0.609
1 1.000	1.625	0.688	1.031	0.688	1.609	0.656	1.031	0.688
1 ⅛ 1.125	1.813	0.766	1.156	0.766	1.797	0.719	1.156	0.766
1 ¼ 1.250	2.000	0.844	1.281	0.844	1.984	0.797	1.281	0.844
1 ⅜ 1.375	2.188	0.938	1.391	0.938	2.172	0.875	1.391	0.938
1 ½ 1.500	2.375	1.000	1.500	1.000	2.344	0.953	1.500	1.000
1 ⅝ 1.625	2.563	1.094	1.625	1.094	2.531	1.031	1.625	1.094
1 ¾ 1.750	2.750	1.172	1.750	1.172	2.719	1.109	1.750	1.172

All dimensions given in inches.

Proportions of manufactured head after driving and driven head:
A = 1.5D + 0.125; H = 0.425A; F = 1.5H; G = 0.425A.

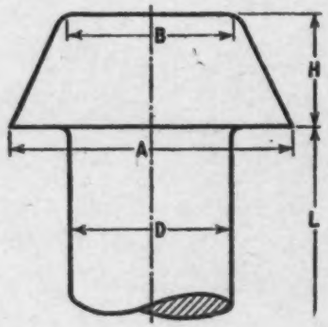
Proportions of hold-on (dolly bar) and rivet set impressions:
A' = 1.485D + 0.124; H' = 0.4A; F' = 1.5H; G' = 0.425A

The dimensions have been adjusted to the decimal equivalents of the nearest common fractions.

MACHINERY'S Data Sheet No. 390, March, 1939

Approved by American Standards Association, March, 1937

AMERICAN STANDARD LARGE RIVETS—6
Pan Head (Manufactured Shape)



Diameter of Body D			Major Diameter of Head A			Minor Diameter of Head B			Height of Head H	
Nominal	Max	Min	Basic	Max	Min	Basic	Max	Min	Max	Min (Basic)
½ 0.500	0.520	0.478	0.875	0.938	0.844	0.500	0.563	0.469	0.381	0.350
⅝ 0.625	0.655	0.600	1.094	1.157	1.063	0.625	0.688	0.594	0.469	0.438
¾ 0.750	0.780	0.725	1.313	1.391	1.282	0.750	0.828	0.719	0.556	0.525
⅞ 0.875	0.905	0.850	1.531	1.609	1.500	0.875	0.953	0.844	0.644	0.613
1 1.000	1.030	0.975	1.750	1.828	1.719	1.000	1.078	0.969	0.731	0.700
1 ⅛ 1.125	1.160	1.098	1.969	2.063	1.938	1.125	1.219	1.094	0.835	0.788
1 ¼ 1.250	1.285	1.223	2.189	2.283	2.158	1.250	1.344	1.219	0.922	0.875
1 ⅜ 1.375	1.415	1.345	2.406	2.500	2.375	1.375	1.469	1.344	1.010	0.963
1 ½ 1.500	1.540	1.470	2.625	2.719	2.594	1.500	1.594	1.469	1.113	1.050
1 ⅝ 1.625	1.665	1.588	2.844	2.938	2.813	1.625	1.719	1.594	1.201	1.138
1 ¾ 1.750	1.790	1.713	3.063	3.172	3.032	1.750	1.859	1.719	1.288	1.225

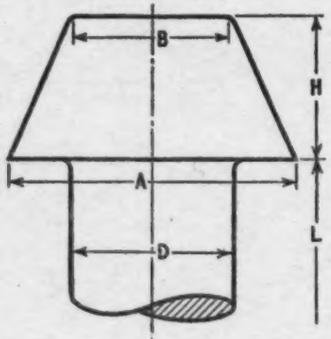
All dimensions given in inches.
Proportions (Basic): A = 1.75D; B = D; H = 0.70D.

The length (L) is measured from the largest diameter of the bearing surface of the head to the point in a line parallel with the axis of the rivet.
Rivets with fillets under the head of not more than 1/16-inch in radius are acceptable.

MACHINERY'S Data Sheet No. 393, May, 1939

Approved by American Standards Association, March, 1937

AMERICAN STANDARD LARGE RIVETS—7
Cone Head (Manufactured Shape)



Diameter of Body D			Major Diameter of Head A			Minor Diameter of Head B			Height of Head H	
Nominal	Max	Min	Basic	Max	Min	Basic	Max	Min	Max	Min (Basic)
½ 0.500	0.520	0.478	0.875	0.938	0.844	0.469	0.532	0.438	0.469	0.438
⅝ 0.625	0.655	0.600	1.094	1.157	1.063	0.586	0.649	0.555	0.578	0.547
¾ 0.750	0.780	0.725	1.313	1.391	1.282	0.703	0.781	0.672	0.687	0.656
⅞ 0.875	0.905	0.850	1.531	1.609	1.500	0.820	0.898	0.789	0.797	0.766
1 1.000	1.030	0.975	1.750	1.828	1.719	0.938	1.016	0.907	0.906	0.875
1 ⅛ 1.125	1.160	1.098	1.969	2.063	1.938	1.055	1.149	1.024	1.031	0.984
1 ¼ 1.250	1.285	1.223	2.189	2.283	2.158	1.172	1.266	1.141	1.141	1.094
1 ⅜ 1.375	1.415	1.345	2.406	2.500	2.375	1.289	1.383	1.258	1.250	1.203
1 ½ 1.500	1.540	1.470	2.625	2.719	2.594	1.406	1.500	1.375	1.376	1.313
1 ⅝ 1.625	1.665	1.588	2.844	2.938	2.813	1.523	1.617	1.492	1.485	1.422
1 ¾ 1.750	1.790	1.713	3.063	3.172	3.032	1.641	1.750	1.610	1.594	1.531

All dimensions given in inches.
Proportions (Basic): A = 1.75D; H = 0.875D; B = 0.938D.

The length (L) is measured from the largest diameter of the bearing surface of the head to the point in a line parallel with the axis of the rivet.
Rivets with fillets under the head of not more than 1/16-inch in radius, are acceptable.

MACHINERY'S Data Sheet No. 394, May, 1939

Approved by American Standards Association, March, 1937

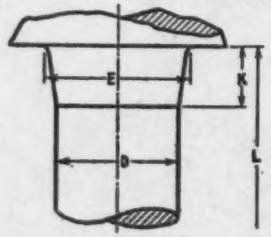
AMERICAN STANDARD LARGE RIVETS—8
Swell-Neck and Button Head

MACHINERY'S Data Sheet No. 395, June, 1939

Approved by American Standards Association, March, 1937

Swell-Neck

(Manufactured Shape)



Diameter of Body D			Swell Neck			
			E		K	
			Diameter Under Head			Length
Nominal	Max	Min	Max (Basic)	Min		
½ 0.500	0.520	0.478	0.563	0.543	0.250	
⅝ 0.625	0.655	0.600	0.688	0.658	0.313	
¾ 0.750	0.780	0.725	0.813	0.783	0.375	
⅞ 0.875	0.905	0.850	0.938	0.908	0.438	
1 1.000	1.030	0.975	1.063	1.033	0.500	
1 ⅛ 1.125	1.160	1.098	1.188	1.153	0.563	
1 ¼ 1.250	1.285	1.223	1.313	1.278	0.625	
1 ⅜ 1.375	1.415	1.345	1.438	1.398	0.688	
1 ½ 1.500	1.540	1.470	1.563	1.523	0.750	
1 ⅝ 1.625	1.665	1.588	1.688	1.648	0.813	
1 ¾ 1.750	1.790	1.713	1.813	1.773	0.875	

All dimensions given in inches.

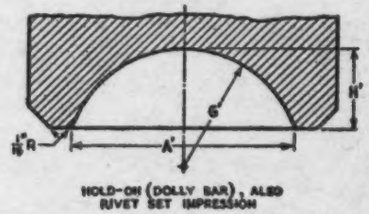
Proportions (Basic): E = D + 0.063; K = 0.50D.

The swell neck is applicable to all standard large rivets except the flat-top countersunk and round-top countersunk types.

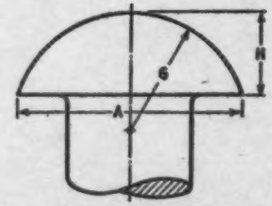
The length (L) is measured from the largest diameter of the bearing surface of the head to the point in a line parallel with the axis of the rivet.

Rivets with fillets under the head of not more than 1/64 inch in radius are acceptable.

Button Head



HOLD-ON (DOLLY BAR), ALSO RIVET SET IMPRESSION



MANUFACTURED HEAD AFTER DRIVING, ALSO DRIVEN HEAD

Body Diameter of Rivet D		Manufactured Head after Driving and Driven Head			Hold-On (Dolly Bar) and Rivet Set		
		A	H	G	A'	H'	G'
½	0.500	0.922	0.344	0.484	0.906	0.313	0.484
⅝	0.625	1.141	0.438	0.594	1.125	0.406	0.594
¾	0.750	1.375	0.516	0.719	1.344	0.484	0.719
⅞	0.875	1.594	0.609	0.844	1.578	0.563	0.844
1	1.000	1.828	0.688	0.953	1.813	0.641	0.953
1 ⅛	1.125	2.063	0.781	1.078	2.031	0.719	1.078
1 ¼	1.250	2.281	0.859	1.188	2.250	0.797	1.188
1 ⅜	1.375	2.516	0.953	1.313	2.469	0.875	1.313
1 ½	1.500	2.734	1.031	1.438	2.703	0.953	1.438
1 ⅝	1.625	2.969	1.125	1.547	2.922	1.047	1.547
1 ¾	1.750	3.203	1.203	1.672	3.156	1.125	1.672

All dimensions given in inches.

Proportions of manufactured head after driving and driven head:

A = 1.827D; H = 0.688D; G = 0.954D.

Proportions of hold-on (dolly bar) and rivet set impressions:

A' = 1.800D; H' = 0.641D; G' = 0.954D.

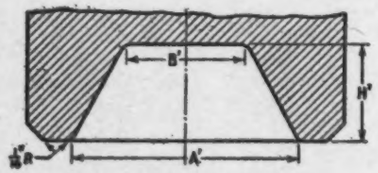
The dimensions have been adjusted to the decimal equivalents of the nearest common fractions.

AMERICAN STANDARD LARGE RIVETS—9
Cone Head and Pan Head

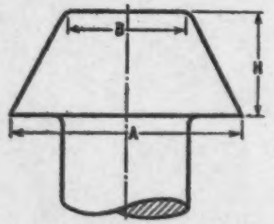
MACHINERY'S Data Sheet No. 396, June, 1939

Approved by American Standards Association, March, 1937

Cone Head



HOLD-ON (DOLLY BAR), ALSO RIVET SET IMPRESSION



MANUFACTURED HEAD AFTER DRIVING, ALSO DRIVEN HEAD

Body Diameter of Rivet D		Manufactured Head after Driving and Driven Head			Hold-On (Dolly Bar) and Rivet Set		
		A	B	H	A'	B'	H'
½	0.500	0.922	0.469	0.406	0.891	0.469	0.391
⅝	0.625	1.141	0.594	0.516	1.109	0.594	0.484
¾	0.750	1.375	0.703	0.625	1.328	0.703	0.578
⅞	0.875	1.594	0.828	0.719	1.547	0.828	0.688
1	1.000	1.828	0.938	0.828	1.781	0.938	0.781
1 ⅛	1.125	2.063	1.063	0.938	2.016	1.063	0.875
1 ¼	1.250	2.281	1.172	1.031	2.219	1.172	0.969
1 ⅜	1.375	2.516	1.297	1.141	2.438	1.297	1.078
1 ½	1.500	2.734	1.406	1.250	2.672	1.406	1.172
1 ⅝	1.625	2.969	1.531	1.344	2.891	1.531	1.266
1 ¾	1.750	3.203	1.641	1.453	3.109	1.641	1.375

All dimensions given in inches.

Proportions of manufactured head after driving and driven head:

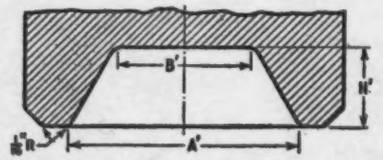
A = 1.827D; B = 0.938D; H = 0.828D.

Proportions of hold-on (dolly bar) and rivet set impressions:

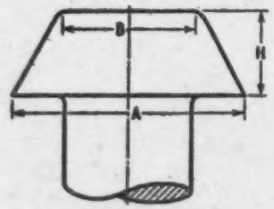
A' = 1.781D; B' = 0.938D; H' = 0.781D.

The dimensions have been adjusted to the decimal equivalents of the nearest common fractions.

Pan Head



HOLD-ON (DOLLY BAR), ALSO RIVET SET IMPRESSION



MANUFACTURED HEAD AFTER DRIVING, ALSO DRIVEN HEAD

Body Diameter of Rivet D		Manufactured Head after Driving and Driven Head			Hold-On (Dolly Bar) and Rivet Set		
		A	B	H	A'	B'	H'
½	0.500	0.922	0.500	0.328	0.891	0.500	0.297
⅝	0.625	1.141	0.625	0.406	1.109	0.625	0.375
¾	0.750	1.375	0.750	0.484	1.328	0.750	0.453
⅞	0.875	1.594	0.875	0.578	1.547	0.875	0.531
1	1.000	1.828	1.000	0.656	1.781	1.000	0.609
1 ⅛	1.125	2.063	1.125	0.734	2.016	1.125	0.688
1 ¼	1.250	2.281	1.250	0.813	2.219	1.250	0.766
1 ⅜	1.375	2.516	1.375	0.906	2.438	1.375	0.844
1 ½	1.500	2.734	1.500	0.984	2.672	1.500	0.906
1 ⅝	1.625	2.969	1.625	1.063	2.891	1.625	0.984
1 ¾	1.750	3.203	1.750	1.141	3.109	1.750	1.063

All dimensions given in inches.

Proportions of manufactured head after driving and driven head:

A = 1.827D; B = D; H = 0.656D.

Proportions of hold-on (dolly bar) and rivet set impressions:

A' = 1.781D; B' = D; H' = 0.609D.

The dimensions have been adjusted to the decimal equivalents of the nearest common fractions.

MACHINERY'S DATA SHEETS 397 and 398

RECOMMENDED NICKEL CAST-IRON COMPOSITIONS—1

Explanatory Notes*

The object of these Data Sheets is to aid the engineer or designer in selecting, for specification purposes, a range of compositions that will produce a suitable combination of physical characteristics in a casting of a required thickness of section. Usually a combination of properties, such as high strength, good machinability and sound dense sections, is desirable in a casting. The Data Sheets offer several choices of composition for each range of thickness, which permits a selection of the desired combination of other properties such as Brinell hardness, machinability, resistance to wear, and density.

The following brief comments on the mechanical properties included in the tables are pertinent:

(a) Tensile strength: For sections up to 1 inch thick, these figures refer to tests on arbitration test bars (1 1/4 inches round). In the thinner sections, the actual strength in the castings will be slightly higher than these values. The strength figures for sections thicker than 1 inch represent the strength in the casting itself.

(b) Brinell hardness: These figures represent the average of tests made on sections of castings corresponding to the tensile tests mentioned in (a).

(c) Machinability: While numerous tests of machinability have been made and described, no fundamental investigations yielding comparative results have been recorded for gray cast iron. This is because of the difficulty of comparing drilling with turning, shaping, and milling operations, etc. The following explanation of the terms used in the tables refers to general shop practice in turning gray iron in the "as cast" condition.

1. Excellent: can be turned at speeds up to 180 feet per minute.
2. Readily machined: can be turned at speeds up to 100 feet per minute.
3. Good: can be turned at speeds up to 75 feet per minute.
4. Economically machined: can be turned at speeds up to 20 to 50 feet per minute.

(d) Wear resistance: This property can be described only in arbitrary terms, because of the varied nature of wear and the lack of suitable wear testing methods. The terms used are derived from service tests under various conditions in comparison with plain gray cast iron and indicate the following conditions:

1. Normal: wear resistance slightly better than plain cast iron (20 to 50 per cent). Wears rapidly in unlubricated rubbing contact.
2. Good: will wear satisfactorily and outlast softer irons from two to three times.
3. Very good: will outwear irons of 180 Brinell hardness two to four times.
4. Excellent: will outwear irons of 180 Brinell hardness four to ten times.

(e) Density: By this term is meant the freedom of sections from internal porosity, shrinks, or draws. This freedom is necessary for castings requiring machined surfaces and for those that must withstand hydraulic or gaseous pressure.

*These notes apply to Data Sheet No. 398, published this month, and Data Sheets Nos. 399 and 400 to be published in August MACHINERY.

MACHINERY'S Data Sheet No. 397, July, 1939

Based on a Compilation by the International Nickel Co., Inc.

RECOMMENDED NICKEL CAST-IRON COMPOSITIONS—2

To Meet American Society for Testing Materials' Class 25 and 30 Specifications
Tensile Strength 25,000 to 35,000 Pounds per Square Inch

	Light			Medium			Heavy					
Section	1/4 to 1/2 Inch			1/2 to 1 Inch			1 to 2 Inches			2 to 4 Inches		
Brinell Hardness	150	180	220	150	180	220	150	180	220	150	180	220
Machinability	Excellent	Readily Machined	Good	Excellent	Readily Machined	Good	Excellent	Readily Machined	Good	Excellent	Readily Machined	Good
Wear Resistance	Normal	Good	Very Good	Normal	Good	Very Good	Normal	Good	Very Good	Normal	Good	Very Good
Density	‡	§	¶	‡	§	¶	‡	§	¶	‡	§	¶
Total Carbon	3.40-3.60	3.30-3.50	3.20-3.40	3.30-3.50	3.20-3.40	3.20-3.40	3.30-3.50	3.20-3.40	3.00-3.20	3.30-3.50	3.00-3.20	3.00-3.20
Manganese	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.55-0.75	0.75-0.95	0.75-0.95	0.75-0.95
Phosphorus*	0.30	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sulphur*	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.12	0.12
Silicon	2.40-2.60	2.20-2.40	1.70-1.90	1.70-1.90	1.60-1.80	1.40-1.60	1.50-1.70	1.30-1.50	1.20-1.40	1.40-1.60	1.30-1.50	1.20-1.40
Nickel†	0.75	1.25	1.50	0.75	1.25	1.50	1.00	1.50	2.00	1.00	1.50	2.00
Chromium	None	None	None	None	None	None	None	None	None	None	0.25-0.35	0.25-0.35

*Maximum. †Minimum. ‡Sound in uniform sections. §Sound in section limits at top of column. ¶Sound throughout widely varying sections.

MACHINERY'S Data Sheet No. 398, July, 1939

Based on a Compilation by the International Nickel Co., Inc.

12 Drill Press Spindles

FOR THE PRICE OF 4

HOW A MACHINE SHOP SUPERINTENDENT SAVED $800.00

A machine shop superintendent came from the West Coast to buy a four-spindle drill press and was prepared to spend about $2000 for it. The works manager of a Milwaukee factory told him about Delta drill presses and suggested he at least *look* at them before he bought any drills. After thoroughly examining Delta machines, he bought *THREE* four-spindle Delta Drill Press units and saved $800. In other words, he sent back to his factory twelve spindles for *LESS* than the cost of four! This is only one instance out of hundreds where plant men are saving thousands of dollars through the use of Delta industrial drill presses. Some manufacturers build their own production tables and have as many as 18 Delta drill press heads all in one row. Others use the heads and assembly parts to lick specially tough jobs.

$301.90

No. 1552 — 4-spindle 14" Drill Press Unit complete with Counterweight Assembly, V-Belts, V-Pulleys, production stand, but without motors or switch.

SEND FOR THIS NEW DRILL PRESS BOOK

Mail coupon for latest Delta Drill Press Book. It contains specifications and prices of complete line of Delta Drill Presses plus details on individual parts from which you can make your own low-cost assemblies.

DELTA MFG. CO.
(INDUSTRIAL DIVISION)
635 E. Vienna Ave.
MILWAUKEE, WISC.

DELTA MFG. CO. (Industrial Division)
635 E. Vienna Avenue, Milwaukee, Wis.

Gentlemen: Please send me a copy of your latest Drill Press Book.

Name .....

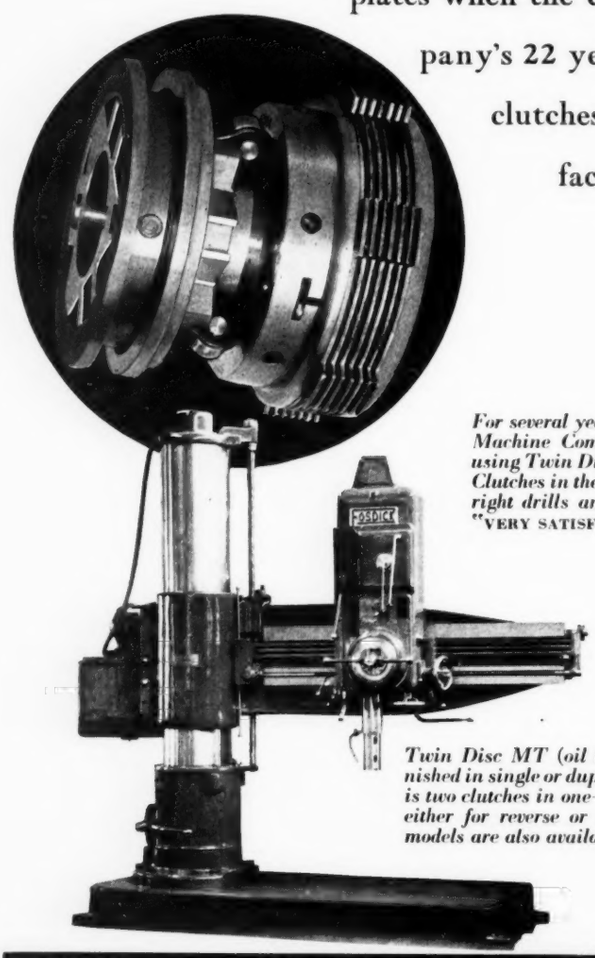
Address .....

City .....

State .....

DISSIPATE HEAT *faster*

Where frequent clutch engagement is demanded, Twin Disc MT (oil type) clutches are preferred. Driving plates are hard phosphor bronze, perforated with oil release holes. Driven plates are saw steel, heat treated and ground with radial grooves for oil release. ¶ This assures not only smooth engagement, high torque capacity with comparatively low operating pressures, but faster frictional heat dissipation . . . a minimum of lag or drag between plates when the clutch is disengaged. ¶ Twin Disc Clutch Company's 22 years studied development, of built-for-the-job clutches, takes into consideration both work and load factors, as well as precision engineering. The new Twin Disc MT clutches provide an excess in safety and performance that gives added value to any machine tool in which they are used.



For several years Fosdick Tool Machine Company have been using Twin Disc Machine Tool Clutches in their radial and upright drills and find them . . . "VERY SATISFACTORY."

Twin Disc MT (oil type) clutches are furnished in single or duplex models. The duplex is two clutches in one—one clutch being used either for reverse or as a brake. Dry type models are also available.

TWIN DISC CLUTCHES

THE UNIVERSALLY ACCEPTED LINK BETWEEN POWER AND PRODUCTION

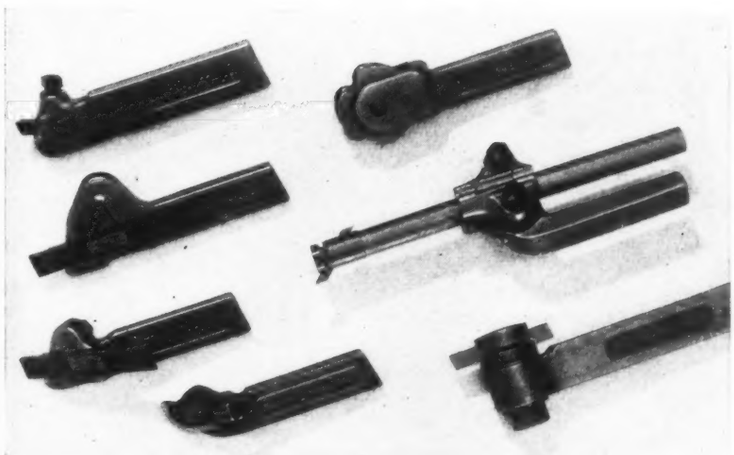
See Exhibit, Booth 2320, Machine Tool Show, Cleveland, Ohio, October 4-13, 1939.

TWIN DISC CLUTCH COMPANY • 1324 RACINE STREET, RACINE, WISCONSIN

● **California:** Los Angeles, Charles W. Carter Co.; San Francisco, Charles W. Carter Co. **Colorado:** Denver, Liberty Trucks and Parts Company **Illinois:** Chicago, Motive Parts Co. of America; Chicago, Western Contractors Supply; Chicago, Wisconsin Industrial Parts. **Massachusetts:** Boston, Rapp-Huckins Co., Inc. **Kansas:** Great Bend, Scheufler Supply Co. **Maine:** Portland, Southworth Mach. Co. **Michigan:** Detroit, Whitney Brothers. **Minnesota:** St. Paul, Truck Parts, Inc. **Missouri:** St. Louis, Auto Parts Company. **New York:** Buffalo, Edward W. Rode; New York City, Twin Disc Clutch Parts & Service of New York, Inc. **Ohio:** Cincinnati, C. McCash; Cleveland, Industrial Eng. Parts. **Oklahoma:** Tulsa, Twin Disc Clutch Co. **Pennsylvania:** Pittsburgh, Contractors Equip. Ser. Co.; Philadelphia, Maerky Machine Works. **Tennessee:** Knoxville, Automotive Equip. & Supply Co. **Texas:** Dallas, Twin Disc Clutch Company; Fort Worth, John Muller Company; Houston, Portable Rig Co., Inc. **Utah:** Salt Lake City, Lund Mach. Co. **Virginia:** Richmond, Standard Parts Corp. **Washington:** Seattle, Berg Evans Chain Co.

SEE OUR EXHIBIT AT BOOTH 2318
MACHINE TOOL SHOW
MTS
CLEVELAND
OCT. 4 to 13, 1939

A type for every regular operation on lathe, planer, shaper, etc.

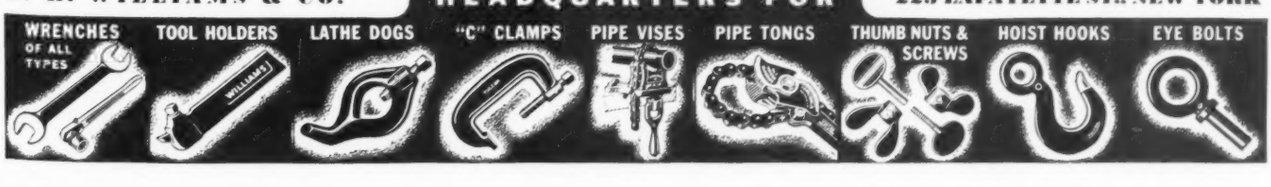


● Machine output, in the final analysis, depends upon the performance of the cutting tool. Williams' Tool Holders are so designed and constructed as to contribute speed, efficiency and greater profit to every regular operation on Lathe, Planer, Shaper, etc. Every Williams' Holder is drop-forged, carefully broached, accurately machined and specially hardened. Williams' construction assures a solid cutter seat and a chatter-proof, clean-cutting tool.

Williams' Improved Line includes Holders for turning, boring, threading, knurling, cutting-off, facing and side work. The two most recent additions are Carbide Turning Holders for square and flat cutters, illustrated above, and Spring Cutting-Off Holders, included in panel

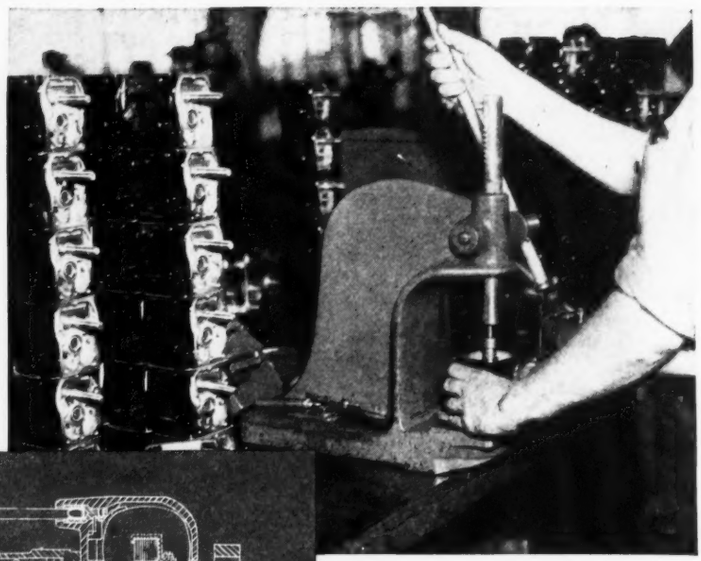
1-524A

J. H. WILLIAMS & CO. HEADQUARTERS FOR 225 LAFAYETTE ST., NEW YORK



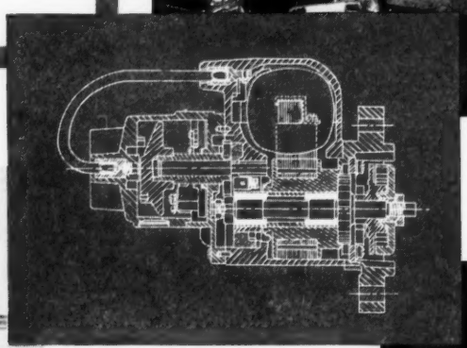
3 YEARS OF CONTINUOUS OPERATION

WITHOUT A SINGLE BEARING FAILURE!

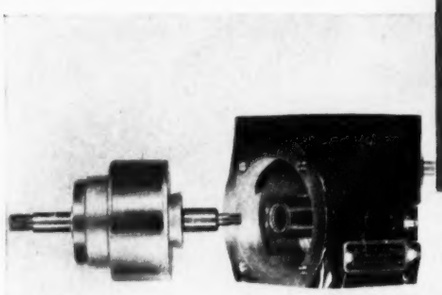


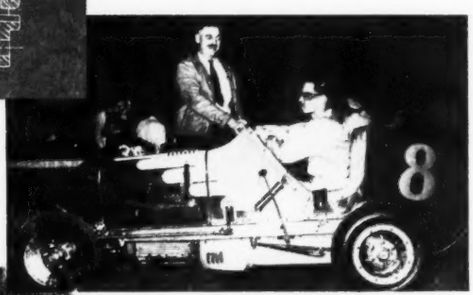
(*Above*) Torrington Needle Bearings are quickly installed in magnetos on the Wico assembly line.

(*Left*) Cross section drawing shows the magneto and the location of the Needle Bearings.

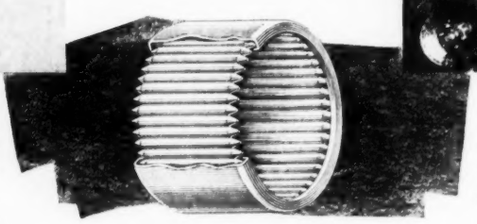


(*Below*) Close-up view shows disassembled magneto unit, with Needle Bearing mounted in the housing.





(*Right*) The Offenhauser Racing Car motors equipped with the Wico Magneto, using Torrington Needle Bearings, operate in excess of 8,000 R. P. M.



THOUSANDS of Wico magnetos operating 24 hours a day have been in service for three years, or even longer—*without a single case of bearing failure!* That is the enviable record chalked up by the Wico Electric Company's magnetos in use in the oil field—and adequate testimony to the service-life of the Torrington Needle Bearings in the Wico magneto.

Performance like that is typical of the Torrington Needle Bearing—for it is engineered for long life under severe conditions. High radial load capacity at high speeds is one of the advantages of the Needle Bearing that contribute to its performance. Made with a full complement of rollers with a small diameter and long axis, the bearing provides many linear inches of contact—with resulting high capacity in even the smallest sizes. Efficient lubrication is another factor in bearing life. The hardened retaining shell of the bearing forms a reservoir for lubricant, holding plenty of grease or oil for long periods of operation, and the rotation of the rollers constantly supplies lubricant to the rotating shaft. When required by the application, the Needle Bearing can be readily adapted to gravity or pressure lubricating systems.

You can incorporate these advantages in your own product at very moderate cost. The simple design of the bearing makes possible a low unit price, and other economies result from the bearing's simplicity of installation. Because the Needle Bearing is built as a unit, it can be easily pressed into place in the housing—there are no loose parts to assemble. Moreover, the small size of the bearing often makes it possible to simplify the design of the housing, thereby saving space, weight, and cost in surrounding members.

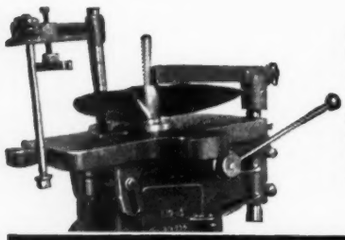
The Torrington Engineering Department will be glad to work with you in adapting the advantages of the Needle Bearing to your products. For further information write for Catalog No. 11. For Needle Bearings to be used in heavier service, request Booklet 103X from our associate, the Bantam Bearings Corporation, South Bend, Ind.

The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.
Makers of Ball and Needle Bearings
Branch Offices in all Principal Cities

TORRINGTON NEEDLE BEARING

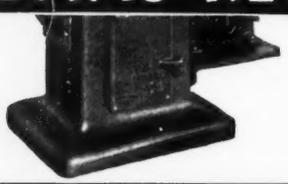
CORRECT » » » DAVIS Multiple Tooth Cutters

Produce accurate, clean-cut keyways, at high speeds with Davis Keyseaters! Davis Multiple Tooth Cutters impart a broaching pull cut that makes quick work of all keyways from 1/16" to 1 1/2".



Cutters can be easily interchanged . . the average job can be set up in two minutes . . and in a few minutes more Davis cutters finish the job!

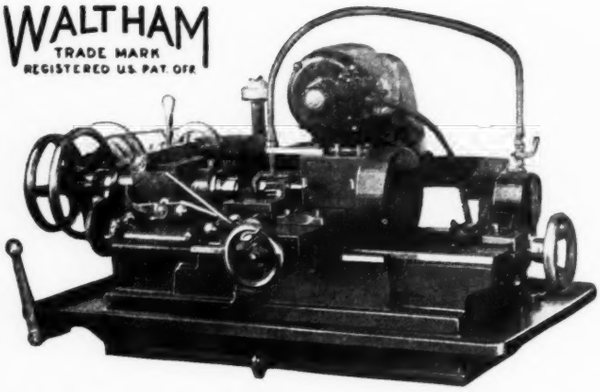
DAVIS KEYSEATERS



Shown: The tilting table model. Cuts straight keyways or keyways tapering as much as 3" per foot.

DAVIS KEYSEATER COMPANY
405 Exchange St. ROCHESTER, N. Y.

WALTHAM
TRADE MARK
REGISTERED U.S. PAT. OFF.



Precision Thread Milling —Low Labor Cost

Unskilled operators can produce highly accurate, small threaded parts on the Waltham Thread Miller. Separate motors for work and cutter heads—rigidly mounted and protected from chips and dust—deliver plenty of power for long run, rapid production.

Waltham Machines improve the production of many kinds of small parts. Write for booklets of our complete line.

WALTHAM MACHINE WORKS
Newton Street, Waltham, Mass.

Makers of Small Thread Millers, Gear Cutters and other Small Automatic Machines

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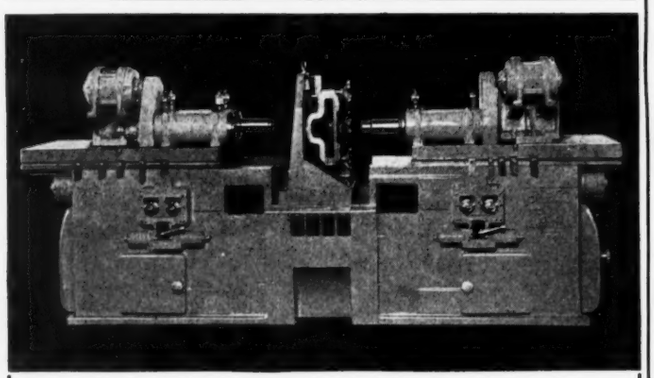


Simplex Precision Boring Machines for Boring, Turning, and Facing

Low first cost—attractive to shops doing precision boring of small or medium production jobs.

Low Operating Cost—simple design and low maintenance. One semi-skilled operator can run several machines.

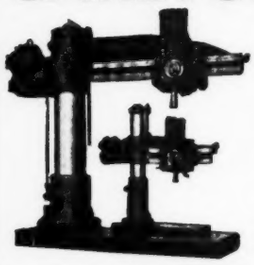
High Flexibility—spindles operating under a wide range of speeds and loads handle a large variety of work.

Wide Application—bore cast iron and nearly all non-ferrous metals, also steel.

Several Models—varying in length and spindle size and mounting one or more spindles. Double end unit type shown above.

Stokerunit Corporation
Milwaukee, Wis.

CARLTON RADIALS



Can be furnished in Column Diameters of 9", 11", 13", 15", 17", 19", 22" and 26" with arm lengths of 3', 4', 5', 6', 7', 8', 9', 10', 11', and 12'. With any style table, electric column binder, power traverse of head on arm and any style motor drive

HIGH POWER EASILY CONTROLLED

Smooth, high power, easily controlled is the secret of Carlton's efficiency on tough, high production jobs. Carlton Radials with 3 or 12 foot arms can be operated with equal ease—without lost motion or constant "walking around".

Write for full details of Carlton's high production possibilities on your work.

THE CARLTON MACHINE TOOL CO. CINCINNATI, OHIO

LELAND-GIFFORD COMPANY · WORCESTER MASS. U.S.A. · MACHINE TOOLS · CRANK SHAFTS

Drilling and Tapping Machines

(Automatic and Semi-Automatic)

LELAND GIFFORD CO.
WORCESTER, MASS.

Multiple Spindle Production Machines

Boring, Drilling (straight line or universal joint), Tapping, Counterboring and Reaming.

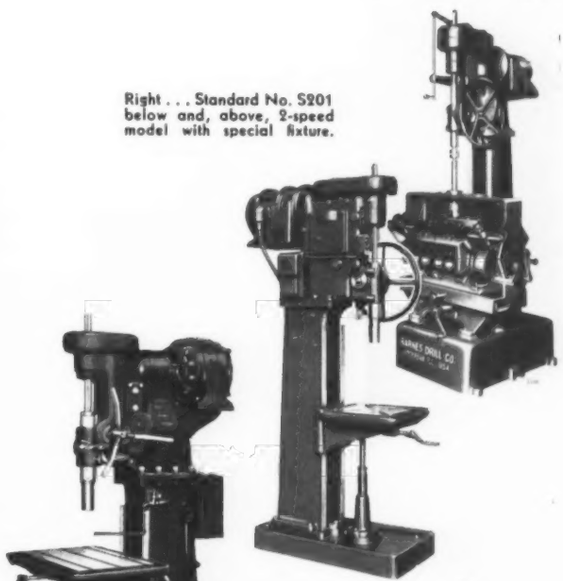
Honing Machines **Special Machinery**

By the builders of the HOLE HOG line.

MOLINE TOOL CO., Moline, Ill.

BARNESDRIL
Drilling Machines
Save Time . . . . Increase Earnings

Standard, semi-standard or special . . . Barnesdril Drilling Machines save time and increase earnings for their owners. This is assured by more than thirty years experience in designing, building and following into profitable productive operation a line of Drilling Machines distinguished by unique patented features and advantages. "All-Geared" . . . no inherent belts, "Self-Oiling" . . . forced-feed lubrication from within. "Hydram" . . . automatic cycle including rapid traverse and hydraulic feed directly over center of tools. Pioneers all . . . these and other elements of progressive design make Barnesdril Drilling Machines the smartest of smart investments today. Illustrated are principal standard Barnesdril Drilling Machines and some installations. Other machines, and many other installation photographs with production data are available. The experience of our engineers is yours for developing new applications of Barnesdril Drilling Machines. Write for Catalog M. Send us drawings for estimates on specific drilling problems.



Right . . . Standard No. S201 below and, above, 2-speed model with special fixture.

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CLEVELAND
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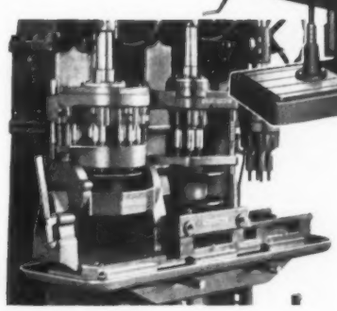
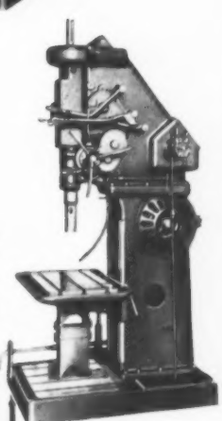


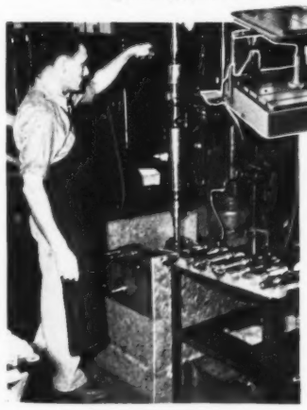
Above . . . No. 210 single spindle. At left 3-spindle 210 Gang.

Right, and Below . . . No. 262. Unexcelled or general purpose work.

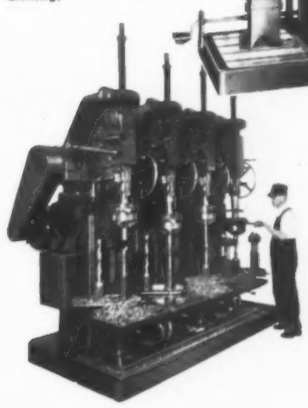


Right . . . Typical of Nos. 201¼, 221½, and 242.

Below a Gang for inverted drilling.



Right . . . Hydrams in 3 sizes for heavy duty.



BARNES DRILL CO. 814 CHESTNUT STREET . . . ROCKFORD, ILLINOIS, U. S. A.

MADE IN ROCKFORD, ILLINOIS, U. S. A.

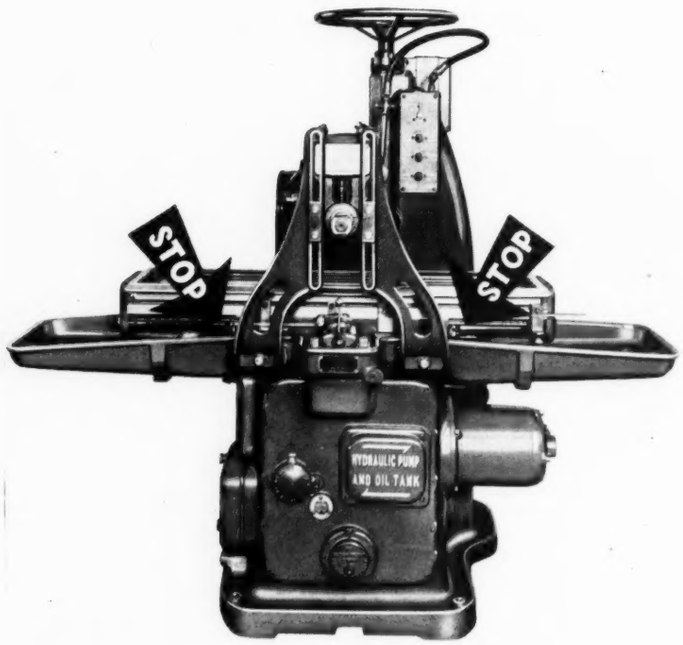
In RIGIDMILS

"Close Stop" For Table Holds Work to Close Limits

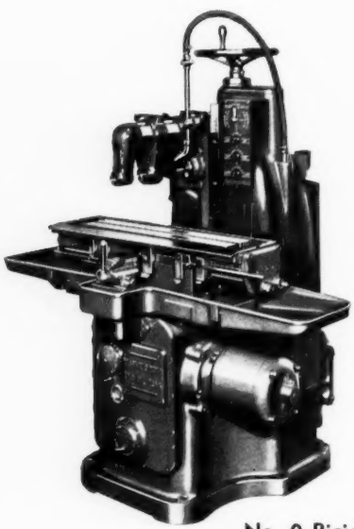
"Close Stop" within ± 0.0005" at ends of table-travel is available when desired for No. 0 and No. 1 Rigidmils through the adaptability of their Sundstrand Hydraulic Equipment. With "Close Stop", the table encounters an adjustable positive stop, dwells an instant, then automatically rapid traverses to complete its cycle. Available for one or both ends of the table, this equipment steps up precision production substantially on certain types of manufacturing, need not be purchased when ordinary limits on table-travel are sufficient.

Sundstrand No. 0 and No. 1 Hydraulic Rigidmils are reliable, accurate, rugged; easy to set up; easy to operate; remarkably effective on the wide variety of milling in their respective capacities. No. 0 Rigidmil is available with hand feed.

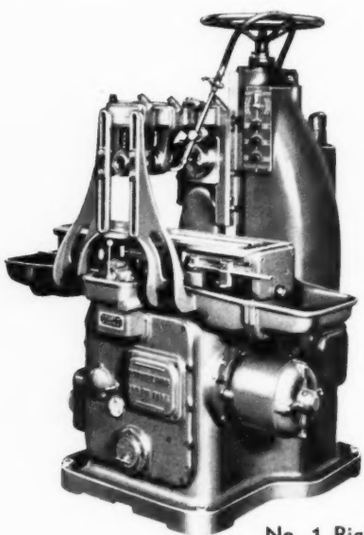
Bulletins 382 and 383 illustrate and describe features and advantages of these advanced design Rigidmils, show climb cutting and cycle diagrams, contain complete specifications. *Write, today, for copies of these Bulletins.* Note wide speed-ranges and feeds available; check power, capacity, adaptability . . . ask the Sundstrand Engineered Production Department to figure on applications of these versatile Rigidmils to your work. "Your Smartest Investment Today . . . Modern Machine Tools".



No. 0 Rigidmil
Hand Feed



No. 0 Rigidmil
Hydraulic Feed



No. 1 Rigidmil
Hydraulic Feed

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A.

SUNDSTRAND MACHINE TOOL CO.

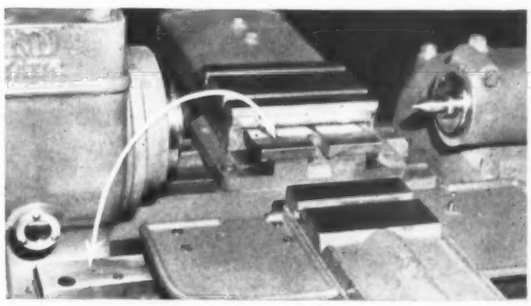
MADE IN ROCKFORD, ILLINOIS, U. S. A.

In STUB LATHES

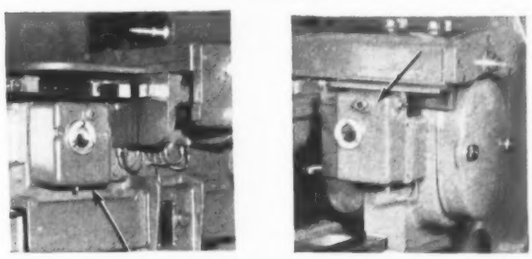
Automatic Oiling, Hardened Ways A Combination That Pays...and Pays

Hardened and ground steel ways, with automatic lubrication, for Front Carriages and Rear Slides make a combination that pays big dividends for users of Sundstrand Automatic Stub Lathes. So accurate is the fit between the hardened ways and the heavy taper-gibbed sliding members that the support provided by the deep bed-casting and rigid carriages continues undiminished right up to the cutting tools. Reliable automatic lubrication maintains the scarcely-perceptible film of oil which makes these close-fitting bearings practical. As a result, cutting materials used on Sundstrand Stub Lathes, including the cemented carbides, set new high records for metal removed, high accuracy, fine finish, large production between grinds. Another plus value is the long, long life of the slides, ways, gibs, and related parts in this power-saving profit-producing combination.

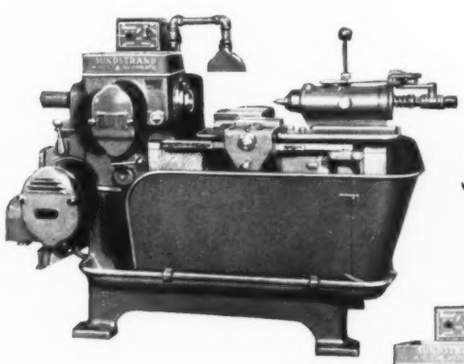
From design to finished product, accuracy and action are built into Automatic Stub Lathes. You make no cams, simply set dogs to established cycles. Three Front Carriage Units give you almost unlimited variety of tool movement. Write for Bulletin 391 and see why these modern machine tools are one of the smartest investments you can make today.



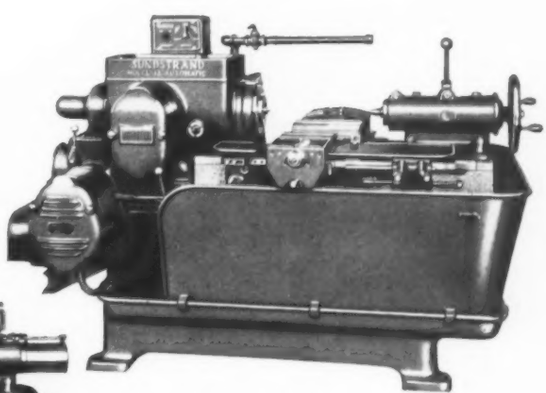
Arrow indicates hardened and ground steel ways for Front Carriage and Rear Slide.



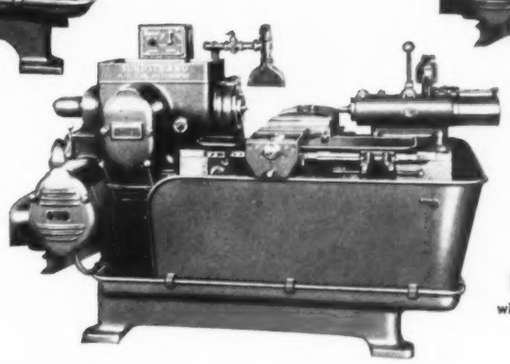
Automatic pressure lubricators shown above. At left, on Front Carriage; at right, on Rear Slide.



MODEL 8
with lever-operated tailstock



MODEL 12
with hand-wheel on tailstock



MODEL 10
with power-operated tailstock

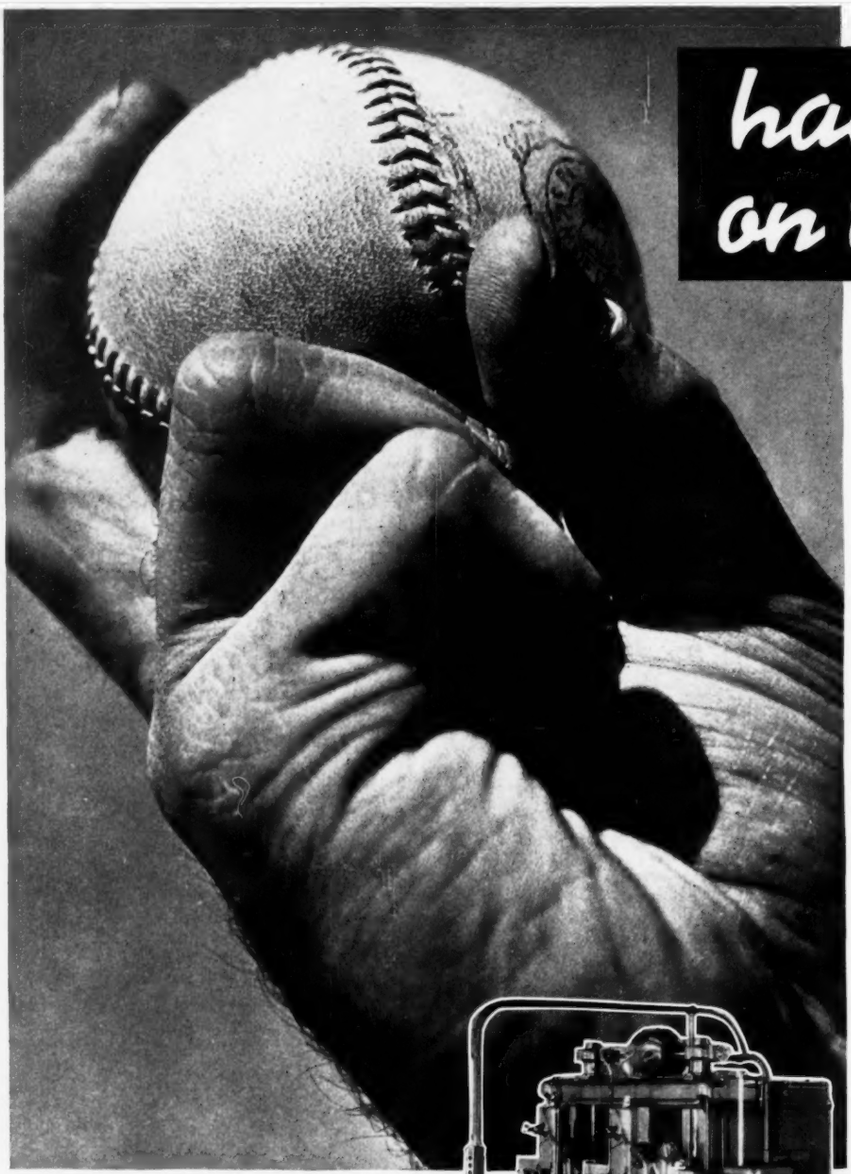
FOR PROFITS
MACHINE TOOL SHOW
CLEVELAND
OCT. 4 to 13, 1939

ROCKFORD, ILLINOIS, U. S. A.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS U.S.A. ·

MADE IN ROCKFORD, ILLINOIS, U. S. A.

HY-DRAULIC PLANER



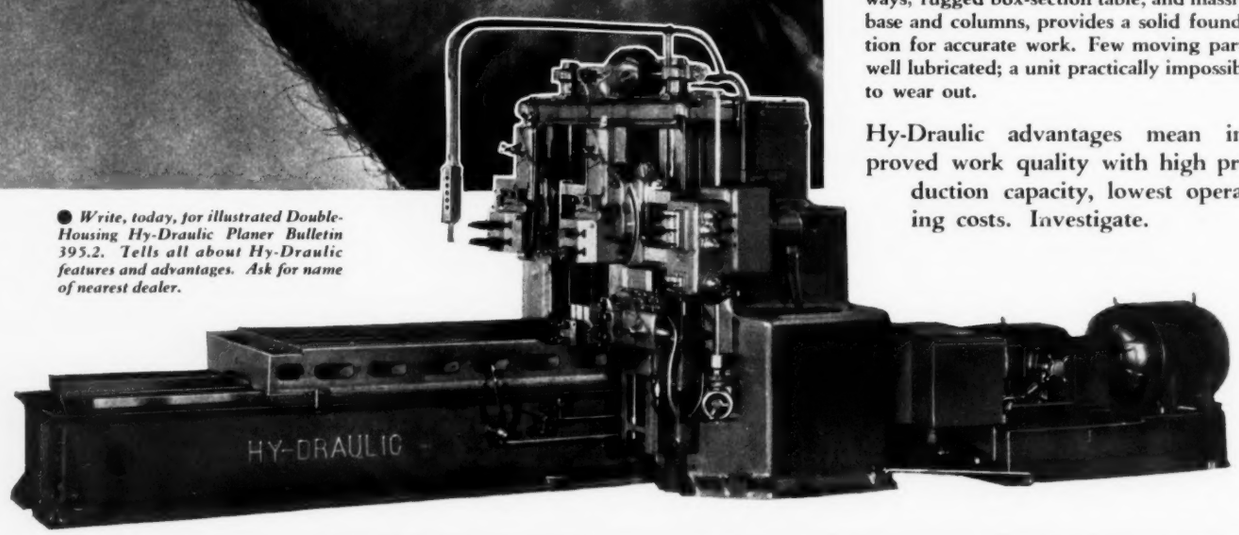
has plenty on the Ball!

"Iron man" of heavy production, the Double-Housing Hy-Draulic Planer has everything . . . accuracy, speed, power, stamina; plus Hy-Draulic features. Smoothest worker you ever saw; always fit for the toughest jobs; has "plenty of stuff on the ball" . . .

- Smooth, powerful, shockless Hy-Draulic table drive gives uniform cutting speeds, any desired speed or stroke within the designed range; puts finer finish on work; is easier on tools, machine, operator; has high return ratios. Table can be stopped, inched, or reversed instantly at any point in travel.
- Hy-Draulic feeds permit infinite selection within the designed range for maximum production in connection with desired cutting speed.
- Standard constant-speed motor, driving hydraulic unit, eliminates power waste of excessive torque, peak loads, braking, and complicated reversing mechanisms.
- Highly accurate construction in every operating detail, with generous bearings on ways, rugged box-section table, and massive base and columns, provides a solid foundation for accurate work. Few moving parts, well lubricated; a unit practically impossible to wear out.

Hy-Draulic advantages mean improved work quality with high production capacity, lowest operating costs. Investigate.

● *Write, today, for illustrated Double-Housing Hy-Draulic Planer Bulletin 395.2. Tells all about Hy-Draulic features and advantages. Ask for name of nearest dealer.*



Hy-Draulic

Shapers . . Planers . . Slotters . . Shaper-Planers

ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

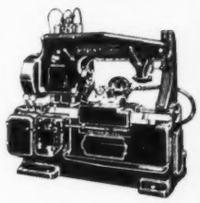
MADE IN ROCKFORD, ILLINOIS, U. S. A.

"Your Smartest Investment Today . . . Modern Machine Tools"

BARBER B-C COLMAN

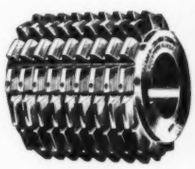
Hobbing Machines

Seven standard B-C Hobbing Machines, range in capacity from 1" diameter by ½" face to 14" diameter by 14" face. Special machines built to order.



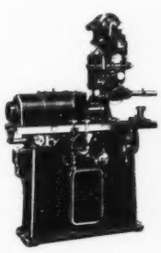
HOBS

B-C Ground Hobs for utmost in precision, production, finish, value. B-C Hobs with unground tooth-forms for less rigid requirements and lowest first cost.



Hob Sharpening Machines

Made in 2 sizes, both automatic. Grind accurately any make of straight- or helical-gashed hob which has radial tooth-faces equally spaced.



PRODUCTS

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

SERVICES

ENGINEERING ♦ ♦ ♦ INSPECTION

WRITE FOR DETAILS

BARBER-COLMAN COMPANY

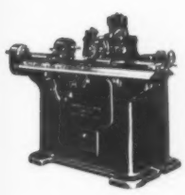
General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

Combination Sharpening Machine

For sharpening any make of Reamer, Hob, or Milling Cutter. New precision, new type sharpening, new economy. For all shops.

Reamers

Fluted and inserted-blade types. Latter have patented mounting. Both have B-C distinctive cutting edges, do unusually fine work.



Reamer Sharpening Machine

Creates unique cutting edge and extreme accuracy. Recreates these qualities in servicing B-C Reamers used in high-production work.

▼ ▼ ▼

FOR PROFITS MACHINE TOOL SHOW

CLEVELAND

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A THOROUGHBRED

AND A WINNER!

The new type T, 3 way machine fills the great demand for a UNIVERSAL broaching machine. It is in a class by itself, the only machine of its kind! It is ideal for Internal Broaching, Surface Broaching, and Press Work.

1. **PUSH DOWN**
   For Internal Broaching, Pressing and Assembly Work.
2. **PULL DOWN**
   For Internal Broaching
3. **SURFACE BROACHING**

EASILY INTERCHANGEABLE

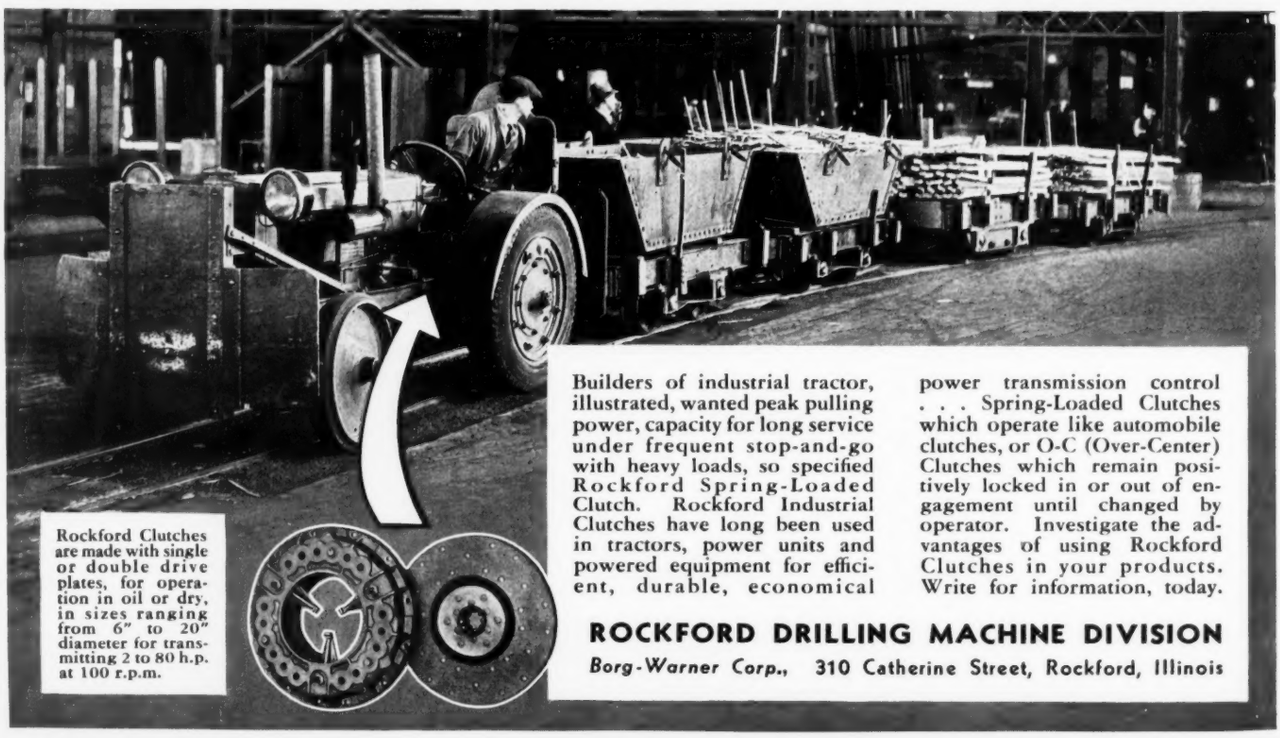
Write for Circular

AMERICAN BROACH & MACHINE CO.
ANN ARBOR, MICHIGAN, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS AND SPECIAL MACHINERY

ROCKFORD Spring-Loaded CLUTCHES

. . . Peak Pulling Power For Industrial Tractors

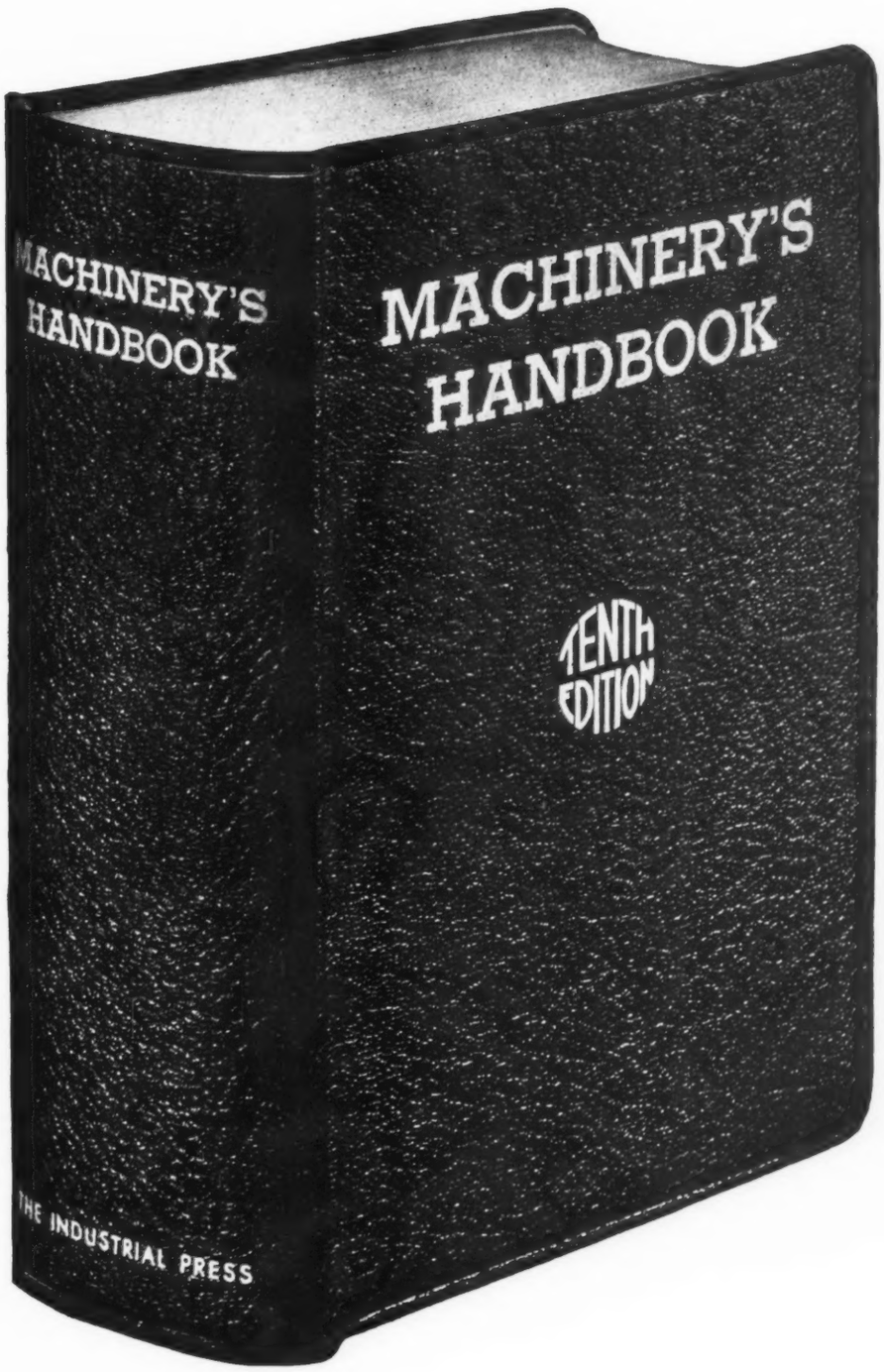


Rockford Clutches are made with single or double drive plates, for operation in oil or dry, in sizes ranging from 6" to 20" diameter for transmitting 2 to 80 h.p. at 100 r.p.m.

Builders of industrial tractor, illustrated, wanted peak pulling power, capacity for long service under frequent stop-and-go with heavy loads, so specified Rockford Spring-Loaded Clutch. Rockford Industrial Clutches have long been used in tractors, power units and powered equipment for efficient, durable, economical power transmission control . . . Spring-Loaded Clutches which operate like automobile clutches, or O-C (Over-Center) Clutches which remain positively locked in or out of engagement until changed by operator. Investigate the advantages of using Rockford Clutches in your products. Write for information, today.

ROCKFORD DRILLING MACHINE DIVISION
Borg-Warner Corp., 310 Catherine Street, Rockford, Illinois

MADE IN ROCKFORD, ILLINOIS, U. S. A.



A Great Reference Book in the Most Complete and Useful Edition Ever Published — *See Two Pages Following*

MACHINERY'S HANDBOOK
in a Brand New Edition

The Tenth Edition of this world-renowned book combines all of the valuable features of earlier editions with the most recent and useful machine-designing and machine-shop data obtainable. Here are the main facts about this new edition.

When Published

March, 1939.

Amount of New Matter

585 pages of valuable information not found in editions earlier than the Sixth. 447 pages not found in the Eighth Edition. 255 pages not found in the Ninth Edition. Why handicap yourself with obsolete standards and data?

Kind of New Matter

Consists mainly of very important new or revised engineering or manufacturing standards; machine shop data; facts, formulas and general information required in modern machine design.

Price of 10th Edition

Notwithstanding the costly additions, the price remains $6 on installments, or $5.70 cash with order.

Outline of Important New Subjects and Additions

- Electric Motor Standards
- Selection of Steels for Tools
- Limits and Fits for Holes and Shafts
- Symbols for Designating Classes of Fits
- Checking Screw Threads of High Helix Angle
- Additional Screw Thread Tolerances
- Tolerances for Extra-Fine Pitches
- Whitworth Screw Thread Tolerances
- Standard Cylindrical Plug Gages
- Standard Thread Plug Gages
- Standard Plain Ring Gages
- Standard Thread Ring Gages
- Standard Plain Adjustable Snap Gage
- Temperature Standard for Gages
- Standard Machine Screws
- Cap-Screws of Socket Type
- S.A.E. Standard Screw Threads
- American National Acme Thread
- Buttress Threads
- Spark Plug Threads
- Checking Thread Sizes
- Measuring Taper Screw Threads
- Checking Buttress Threads
- Hardness Conversion Tables
- Hardness of Steel
- Color Code for Steel Bars
- Steels for Hot-Working
- Non-Ferrous Alloys
- Bearing Metals
- Bearing Lubricants
- Ball Bearing Standards
- British Standard Keys
- Serrated Shafts
- Standard Shaft Couplings
- Standard Gear-Tooth Forms
- Gear Measurement by Pin Method
- Checking Gear Sizes by Chordal Measurement
- Checking Gear-Tooth Thickness
- Backlash for Gears
- British Standard Pitches for Gears
- Module or Metric System for Gears
- Gearing Horsepower Formulas
- British Standard for Bevel Gears
- Spiral Bevel Gears
- Gear-Tooth and Bearing Pressures
- Standard V-Belt Drives
- Motor Power and Speed Limits
- Horsepower and Speed Ratings
- Definitions of Motor Terms
- Electric Welding Definitions
- Welding Electrodes
- Machinability of Metals
- Grinding Cemented-Carbide Tools
- Standard Grinding-Wheel Shapes
- Standard Grinding-Wheel Dimensions
- Standard Forming Tool Blanks
- Tolerances for Shafting and Bar Stock
- Standard Tolerances for Forgings
- Steels for Gearing
- Brass and Bronze Gears
- Non-Metallic Gearing
- British Standard Screws
- Standard Set-Screws
- Lengths of Machine Bolts
- Tapers for Milling Machine Spindles
- Standard Taper Pins
- Standard Hacksaw Blades
- American Standard Pipe Plugs
- Steel for Taps
- Fits Obtained by Tapping
- Steels for Twist Drills
- Metric Threads
- Standards for Drawings
- Standard Abbreviations
- Standard Symbols

·QUESTIONS·

For Engineers and Shop Men

Thousands of questions like the samples below are answered fully and clearly by the Tenth Edition of MACHINERY'S Handbook – the latest and best edition for all users of engineering and shop data.

Do you know of any precise method of indicating on a drawing the quality of a finished surface and of checking the machined surface? See page 1676, Tenth Edition.

Do you know of a simple, accurate formula for checking screw threads and worms by the 3-wire method, when the helix or lead angle is high and must be taken into account? See page 1318, Tenth Edition.

In designing a motor-driven machine, do you know where to obtain the standard mounting dimensions for electric motors, such as bolt-hole spacing and other essential dimensions? See page 1625, Tenth Edition.

What kind of section lining is used on drawings to represent, say, an aluminum alloy, according to the American standard? See page 1771, Tenth Edition.

If a turret lathe or "automatic" must be used for various classes of work, how many parts at one time should be produced before retooling the machine for another job so as to obtain the right balance between set-up cost per piece and storage cost? See page 1780, Tenth Edition.

Is it practicable to check tapering screw threads by the 3-wire method? See page 1326, Tenth Edition.

In grinding carbide tools, what classes of wheels have proved satisfactory and how should the tool be applied to the wheel? See page 921, Tenth Edition.

If a drop-forging weighs about 2 pounds, could it be held to size within 0.020 inch in ordinary commercial forging practice? See standard tolerances for forgings on page 1174, Tenth Edition.

What are the approved types of plug gages for (1) holes up to 8 inches in diameter, (2) for larger holes? See pages 1196 and 1200, Tenth Edition.

What gear steels would you use (1) for case-hardened gears? (2) for fully hardened gears? (3) for gears which are to be machined after heat-treatment? See page 690, Tenth Edition.

Do you know of a simple accurate method of checking spur and helical gear sizes by measurement over pins or wires? See page 810, Tenth Edition.

Have you ever checked gear sizes by the chordal method of measuring over two or more gear teeth? The required dimensions may be obtained easily. See page 817, Tenth Edition.

Is it practicable to tap holes and obtain (1) Class 2 fits? (2) Class 3 fits? See page 1350, Tenth Edition.

Is there an approved standard in the United States for the bearing metal used for car journals? See page 517, Tenth Edition.

If the speed of a ball bearing is 5000 R.P.M. and the radial load 200 pounds, what kind of lubricant should be used? See page 541, Tenth Edition.

What are the chief differences between the American, British and German standards for gear teeth? See pages 616, 663 and 667, Tenth Edition.

What material has proved successful for worm gears? See page 695, Tenth Edition.

Is the present S.A.E. standard for screw threads the same as the American standard, or does one include series of pitches not in the other? See page 1272, Tenth Edition.

What general type of thread ring gage has been standardized because of its dependable features? See page 1204, Tenth Edition.

If you bought some No. 4 machine screws at a hardware store or from a dealer, would you expect the pitch to conform with the American standard? See page 1232, Tenth Edition.

Does the present American standard for cap-screws include both hexagon-socket and fluted-socket types? See pages 1242 and 1243, Tenth Edition.

What are the common commercial V-belt sizes and the horsepower ratings of each size? See page 834, Tenth Edition.

What cutting speeds and feeds are typical in shops using carbide tools? See page 894, Tenth Edition.

Is an Acme thread similar to a trapezoidal metric thread? See pages 1283 and 1288, Tenth Edition.

Is the profile of an American (National) standard thread the same as the International Metric Thread (Systeme Internationale)? See pages 1265 and 1296, Tenth Edition.

If the hardness of a tap is, say, 58 Rockwell C, is it too hard? Too soft? Just right? See page 1350, Tenth Edition.

Is there a standard series of tapers for the spindles of milling machines made in the United States and is there a British standard? See page 1411, Tenth Edition.

Have hacksaw blades been standardized as to length, width, thickness and pitch of teeth? See page 1440, Tenth Edition.

If the Brinell hardness of steel is, say, 460, what is the equivalent number for Rockwell A? Rockwell C? Rockwell D and Rockwell Superficial? See page 1491, Tenth Edition.

What kinds of steel are extensively used for carburized parts? See pages 1468 and 1471, Tenth Edition.

When tool steels must have heat-resisting properties, what kind of steel should be used? See page 1505, Tenth Edition.

In checking screw threads by the 3-wire method, should the rule or formula be based upon (1) the pitch diameter? (2) the outside diameter? See page 1314, Tenth Edition.

Is there a standard direction of rotation for all types of non-reversing electric motors? See page 1628, Tenth Edition.

What is the recommended relationship between the speed range of an electric motor and its maximum horsepower? See page 1625, Tenth Edition.

Is there a recognized color code for painting the ends of steel bars so the kind of steel can be determined? See page 1522, Tenth Edition.

If the temper of sheet brass is designated as "hard," is it twice as hard as the temper referred to as "half hard"? See page 1611, Tenth Edition.

What are the five American standard sizes for drawings? See page 1769, Tenth Edition.

In checking drawings, do you follow a definite plan and check systematically? See approved checking list on page 1777, Tenth Edition.

If the degree of roughness or smoothness of a finished surface is indicated by *"rms"* value of, say, 30, just what does this number represent and how is it definitely related to the quality of the surface? See page 1776, Tenth Edition.

Are the American standard diameters for *transmission* shafting the same as for *machinery* shafting in all cases? See page 496, Tenth Edition.

What kinds of tool steel would you select (1) for arbors? (2) for die parts? (3) for punches? (4) for gages? (5) for reamers? (6) for taps? See 16-page chart or table beginning on page 1506, Tenth Edition.

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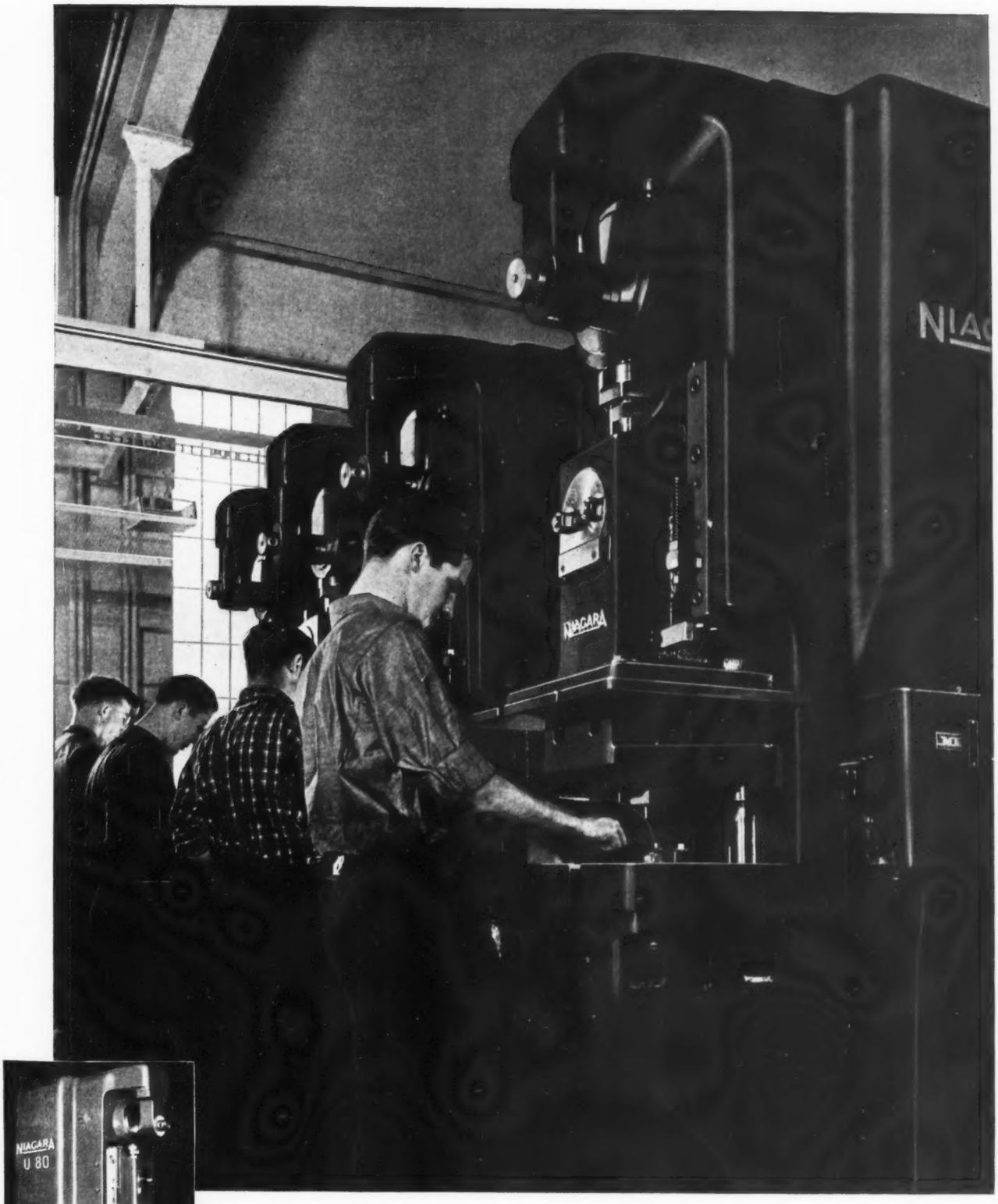

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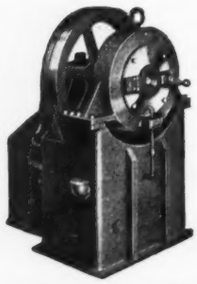

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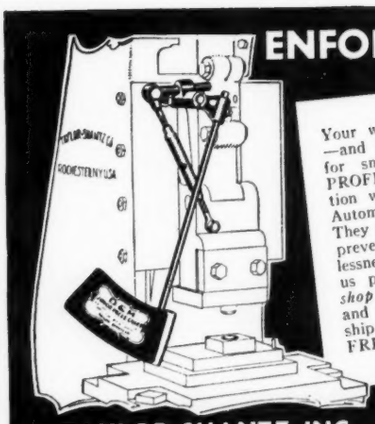

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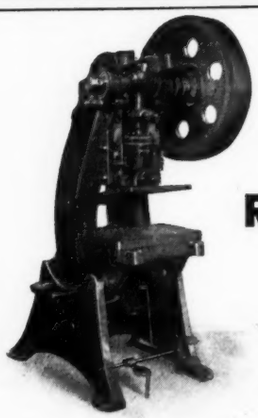

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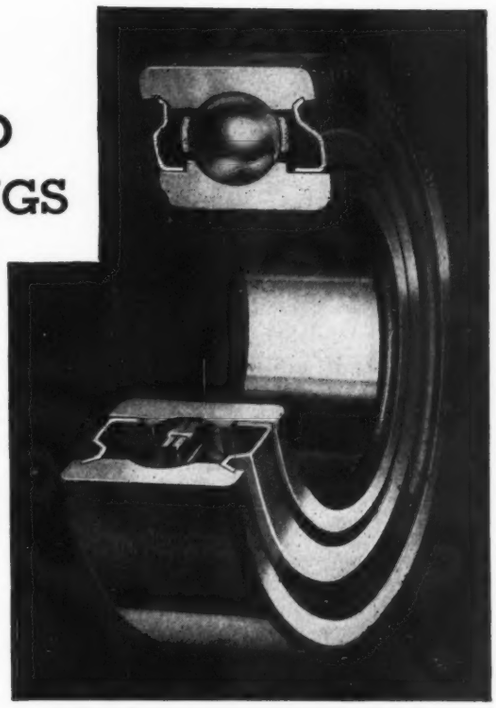

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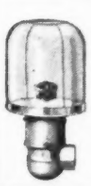

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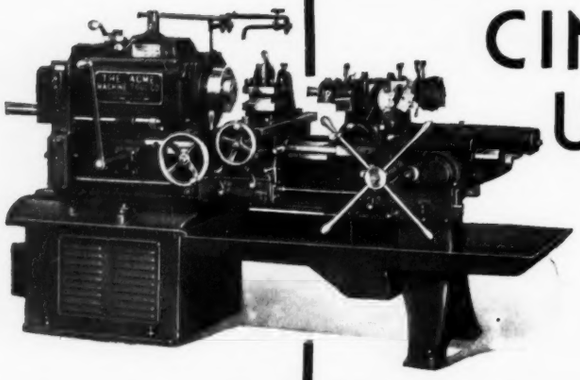

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For location of advertisements of manufacturers listed in this index see alphabetical index, pages 133-134

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AIR HOISTS
See Hoists, Air.

AIR TOOLS
See Grinders, Pneumatic; Drills, Portable Pneumatic, etc.

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Carnegie-Illinois Steel Corp. (U.S. Steel Corp., Sub.) Pittsburgh, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.
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Bunting Brass & Bronze Co., Toledo, Ohio.
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See Presses, Arbor.

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National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Co., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

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Bunting Brass & Bronze Co., Toledo, O.
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BARS, BORING
See Boring Bars.

BARS, PHOSPHOR BRONZE
Bunting Brass & Bronze Co., Toledo, O.
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BARS, STEEL
Carnegie-Illinois Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.
La Salle Steel Co., P. O. Box 6800A, Chicago.
Ryerson, Joseph T., & Son, Inc., 2558 West 16th St., Chicago, Ill.

BEARINGS, BABBITT
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., New Castle, Pa.
Link-Belt Co., Chicago.

BEARINGS, BALL
Ahlberg Bearing Co., 3033 West 47th St., Chicago.
Ball & Roller Bearing Co., Danbury, Conn.
Bearings Co. of America, Lancaster, Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Inc., Poughkeepsie, N. Y.
Gwilliam Co., 360 Furman St., Brooklyn, N. Y.
Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Schatz Mfg. Co., Poughkeepsie, N. Y.
S K F Industries, Inc., Philadelphia.
Split Ballbearing Corp., Lebanon, N. H.
Torrington Co., Torrington, Conn.

BEARINGS, BRONZE AND SPECIAL ALLOYS
Besly, Chas. H., & Co., 120-B N. Clinton St., Chicago.
Bunting Brass & Bronze Co., Toledo, O.
Haynes Stellite Co., Kokomo, Ind.
Johnson Bronze Co., New Castle, Pa.
Morgan Engineering Co., Alliance, O.

BEARINGS, LINESHAFT
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., Chicago.
Roller Bearing Co. of America, Trenton, N. J.
Shafer Bearing Corp., 35 East Wacker Drive, Room 2828, Chicago.
S K F Industries, Inc., Philadelphia.

BEARINGS, NEEDLE
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
Torrington Co., Torrington, Conn.

BEARINGS, OILLESS
Arguto Oilless Bearing Co., 145 Berkley St., Wayne, Junction, Philadelphia, Pa.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., New Castle, Pa.

BEARINGS, ROLLER
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Fafnir Bearing Co., New Britain, Conn.
Gwilliam Co., 360 Furman St., Brooklyn, N. Y.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
Shafer Bearing Corp., 35 East Wacker Drive, Room 2828, Chicago.
S K F Industries, Inc., Philadelphia.
Split Ballbearing Corp., Lebanon, N. H.
Timken Roller Bearing Co., Canton, O.

BEARINGS, SPLIT
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BEARINGS, TAPERED ROLLER
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General Electric Co., Schenectady, N. Y.
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Watson-Stillman Co., Roselle, N. J.

BENDING MACHINES, PIPE
Watson-Stillman Co., Roselle, N. J.

BLOCKS, CHAIN
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Denison Engrg. Co., Columbus, O.
Landis Mch. Co., Inc., Waynesboro, Pa.
National Acme Co., Cleveland, O.

BOLTS AND NUTS
National Acme Co., Cleveland, O.

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Lincoln Electric Co., Cleveland, O.

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Bullard Co., Bridgeport, Conn.
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Consolidated Machine Tool Corporation, Rochester, N. Y.
Sellers, Wm., & Co., Inc., Philadelphia.

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Harnischfeger Corp., Milwaukee, Wis.
Landis Tool Co., Waynesboro, Pa.
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Lovejoy Tool Co., Inc., Springfield, Vt.
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Murchey Mch. & Tool Co., 951 Porter St., Detroit, Mich.

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PIPE TONGS
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PLANERS
American Tool Wks. Co., Cincinnati, O.
Bethlehem Steel Co., Bethlehem, Pa.
Cincinnati Planer Co., Cincinnati, O.
Consolidated Machine Tool Corporation, Rochester, N. Y.

PLANERS, OPEN-SIDE
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Schatz Mfg. Co., Poughkeepsie, N. Y.

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Lucas Mch. Tool Co., Cleveland, O.
V & O Press Co., Hudson, N. Y.

PRESSES, DROP
See Hammers, Drop.

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Baird Machine Co., Bridgeport, Conn.
Etna Machine Co., Toledo, O.
Niagara Machine & Tool Wks., Buffalo.
V & O Press Co., Hudson, N. Y.

PRESSES, FORGING
Morgan Engineering Co., Alliance, O.
Niagara Machine & Tool Wks., Buffalo.
Schatz Mfg. Co., Poughkeepsie, N. Y.
V & O Press Co., Hudson, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES, HYDRAULIC
American Broach & Mch. Co., Ann Arbor, Mich.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago.
Morgan Engineering Co., Alliance, O.

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PRESSES, SCREW
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Schatz Mfg. Co., Poughkeepsie, N. Y.

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Niagara Machine & Tool Wks., Buffalo.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Taylor-Shantz, Inc., Rochester, N. Y.
V & O Press Co., Hudson, N. Y.
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Morgan Engineering Co., Alliance, O.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Springfield Mch. Tool Co., 631 Southern Ave., Springfield, O.

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Gorton Machine Co., 1109 13th St., Racine, Wis.
Leland-Gifford Co., Worcester, Mass.
Pratt & Whitney Co., Hartford, Conn.
Preis Engraving Machine Co., 157 Summit St., Newark, N. J.

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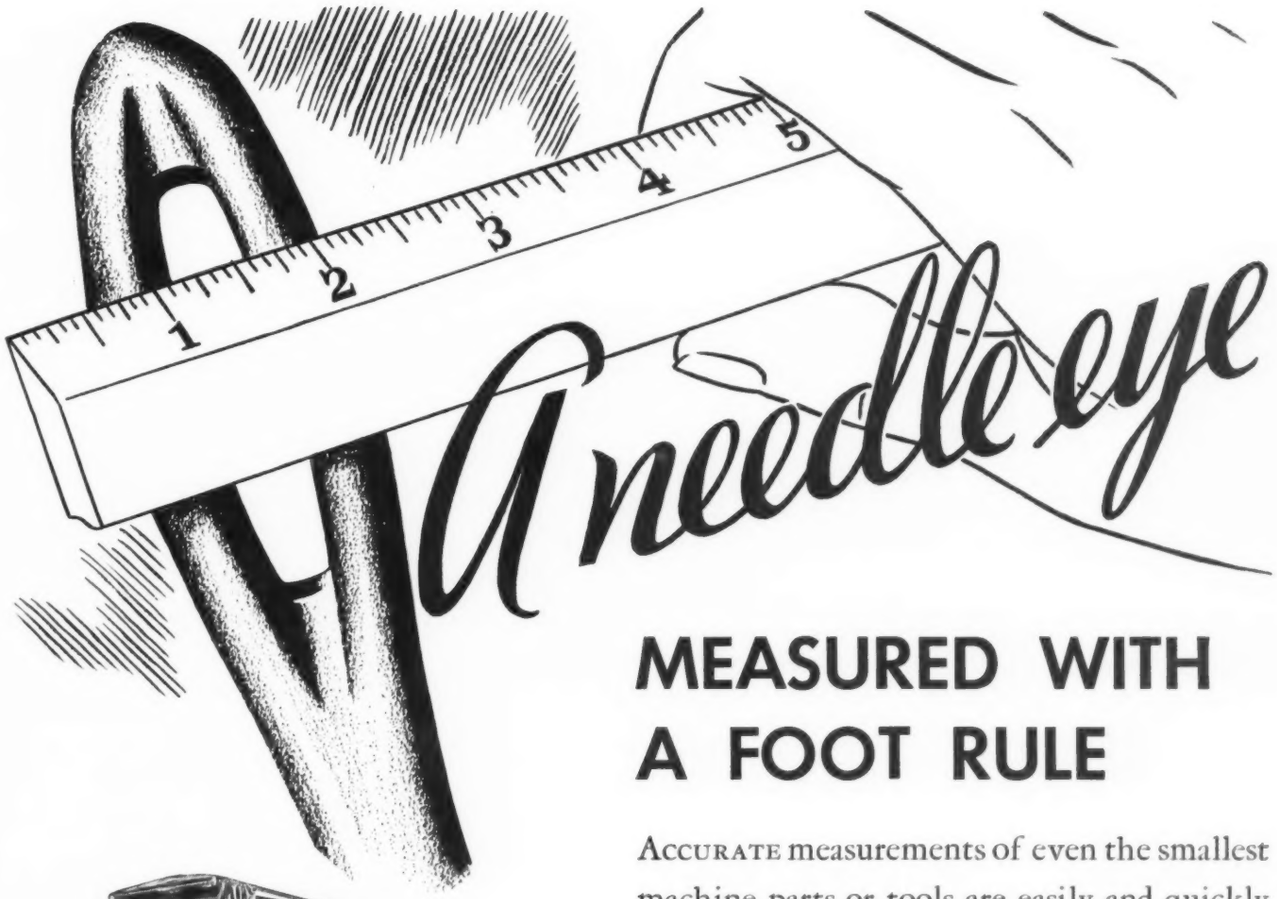
Link-Belt Co., Chicago.

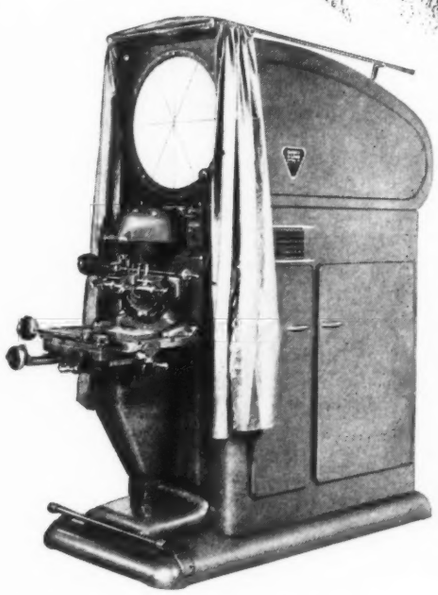
PULLEYS, FRICTION
Link-Belt Co., Chicago.

PUMPS, COOLANT, LUBRICANT AND OIL
Brown & Sharpe Mfg. Co., Providence.



A needle eye

MEASURED WITH A FOOT RULE



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